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FROM THE

UNITED STATES GOVERNMENT

H. O. No. 173

# SOUTH AMERICA PILOT

VOLUME II

SOUTHERN PART, FROM THE PLATA RIVER
ON THE EAST COAST
TO
CORCOVADO GULF ON THE WEST COAST,
AND INCLUDING MAGELLAN STRAIT, THE FALKLAND
ISLANDS, AND ISLANDS TO THE SOUTHEAST,
AND ANTARCTIC SOUTH AMERICA

PUBLISHED BY THE HYDROGRAPHIC OFFICE
UNDER THE AUTHORITY OF THE
SECRETARY OF THE NAVY

FIRST EDITION

WASHINGTON
GOVERNMENT PRINTING OFFICE
1916

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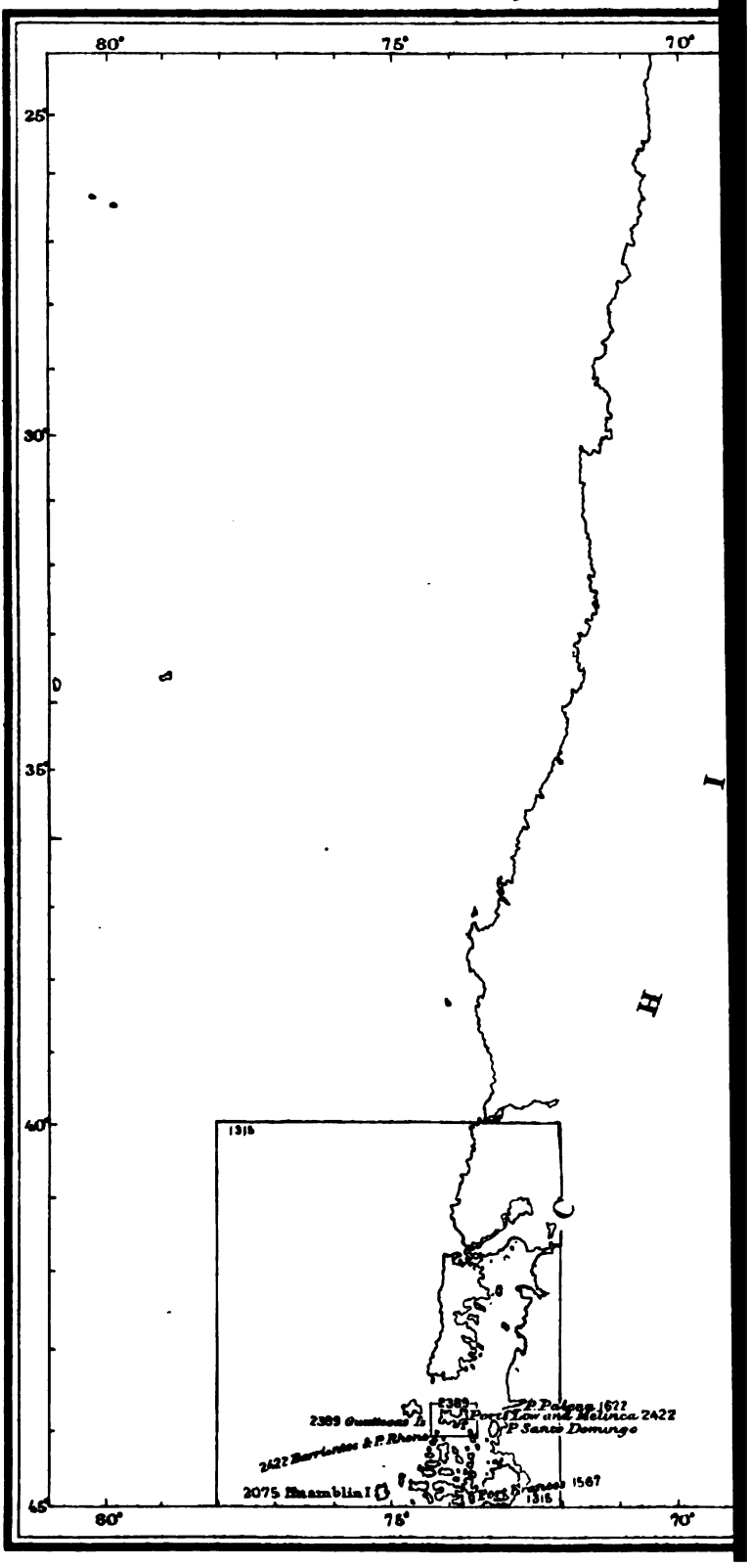

# PREFACE.

This publication comprises the sailing directions for the coasts South America from Cape San Antonio, the southern entrance nt of the Plata River, to Corcovado Gulf, on the west coast of ile. It includes also the sailing directions for Magellan Strait Tierra del Fuego, the Falkland Islands, and the rocks and nds to the southeastward, the South Shetlands and Orkneys, etc., Antarctic South America.

The information contained herein is taken mainly from H. O. blications Nos. 88 and 89, revised and brought up to date. The ormation relating to Antarctic South America is taken mainly m the reports of the French expeditions commanded by Dr. rcot.

Chapter IX is taken from "Derrotero de los Archipielagos de agonia," published by the Hydrographic Office of Chile.

It contains the latest information from all reliable sources, and ludes all hydrographic notices to mariners relating to the coasts which it treats up to and including No. 52 of 1915.

The bearings and courses are true, in degrees from 0° (north) 360°.

Bearings limiting sectors of lights are toward the light.

The directions of winds refer to the points from which they blow; currents, the points toward which they set. These directions are e.

Variation of the compass for 1915, with annual rate of change, hown on H. O. Chart No. 2406.

The mile is approximately 2,000 yards, or 60 to a degree of lati- le.

Soundings are referred to low water of ordinary springs.

Details of lights should be taken from the latest light lists and rts, as no attempt has been made to cover these details in this ume.

The return coupons in the front of the book should be sent in at e expiration of the years shown on them.

In the interest of mariners, information relating to inaccuracies this Pilot should be sent to the United States Hydrographic Office, ashington, D. C.

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# GLOSSARY OF SPANISH WORDS WHICH MAY BE OF USE TO THE NAVIGATOR.

Adelante—before, forward.
Aduana—customhouse.
Agua—water.
Aguas muertas—neap tide.
Aguas vivas—spring tide.
Aguja—magnetic needle.
Alcance—visibility.
Aldea—village
Almacén—storehouse.
Alto—height.
Alumbrado—lighted.
Amarilla—yellow.
Amarra—anchorage, mooring.
Amarrar—to moor, to make fast.
Ancla—anchor.
Aplacerado—shelving.
Arcilla—clay.
Arena—sand.
Arenisco—gravelly, sandy.
Arrecife—reef.
Arroyo—brook, rivulet.
Astillero—navy yard, graving dock.
Atajador—driver of horses.
Atalaia—lookout station, signal staff.
Atracar—to come alongside.
Babor—port.
Bahía—bay.
Baja, bajo—low, shoal.
Baja de mar—ebb.
Baja mar—low water.
Balisa, baliza—beacon.
Banco—bank.
Bandera—flag.
Barlovento—luff.
Barra—bar.
Barranca—ravine, precipice.
Barrio—quarter, district.
Barro—mud, clay.
Blanco—white.
Bote salvavidas—life boat.
Boya—buoy.
Braza—fathom.
Brújula—compass.
Bruma—fog.
Buque de vela—sailing ship.
Cabo—cape.
Cabos corrientes—running rigging.
Cabos firmes—standing rigging.
Cala—hold.
Calado—draft.
Caleta—small bay, road.
Camino de hierro—railway.
Campanario—church tower.
Canal—channel.
Capilla—chapel.
Carbón de piedra—sea coal.
Carena—keel.
Carenar—to careen.
Carga, cargazón—cargo.
Carta de cambio—exchange.
Carta de flete, carta de fletemento, carta de partida—charter party.
Carta de sanidad—bill of health.
Casa—house.
Casajo—gravel.
Casco—hull, wreck.
Caseta—small house.
Castillo—castle.
Caudal—capital, wealth.
Cerro—hill.
Chico—small.
Choque—stroke, collision.
Concha, conchilla—shell.
Contraste—contrast, opposition.
Cuarta—compass point.
Cubierta—deck.
Cuenca—river bed.
Cuenta—reckoning.
Dársena—dock, harbor, basin.
Demora—bearing, delay.
Demorar—to bear, to delay.
Depósito—warehouse.
Derecho—right.
Desembarcadero—landing.
Días de demora—demurrage.
Dique—dock.
Dique de carena—dry dock.
Dique seco—dry dock, basin.

Embocadero—mouth, opening.
Embocadura—mouth.
Ensenada—bay.
Ermita—hermitage.
Escollo—rock.
Escotadura—sweep, indentation.
Espiga—sharp, bare point.
Espigón—masthead.
Este—east.
Estero—lagoon, creek.
Estrecho—strait, narrow passage.
Estribar—starboard.
Estuaria—wide river mouth.
Fanal—light tower.
Fango—mud.
Faro—lighthouse.
Ferrocarril—railway.
Filar—to let go, to pay out.
Flujo—flood.
Fondeadero—anchorage.
Fondo—bottom.
Freo—strait.
Fuente—spring.
Gasto—cost.
Glutinoso—glutinous.
Grande—great.
Gris—gray.
Grua—capstan, windlass.
Grueso—swell.
Hondo, hondura—deep.
Hora—hour.
Iglesia—church.
Isla—island.
Isleta—islet.
Izquierdo—left.
Lado—side.
Lago—lake.
Laja—flat rock.
Limo—mud.
Lodo—mud.
Lugar—place.
Luz—light.
Lluvia—rain.
Madera—wood.
Madreporico—coral.
Marea—tide.
Marea alta—high tide.
Marea creciente—flood.
Marea máxima, marea viva—spring flood.
Marea mínima—neap flood.
Marea muerta—slack water.
Marea vaciante, marea menguante—ebb.
Mareada—full sail.
Meridional—southward.
Mesa—tableland, high plain.
Molino—mill.
Monte—mountain.
Muelle—mole, landing wharf.
Nave, navío—ship.
Negro—black.
Niebla—fog, mist.
Norte—north.
Oeste—west.
Ola, onda—wave.
Oro sellado—minted gold.
Pardo—gray.
Paso—pass.
Pedregoso—rocky.
Pelado—bald.
Peligroso—dangerous.
Peña—after end.
Peñedo—stone.
Peñón—rocky mountain.
Pescante á mano—hand derrick.
Pico—Peak.
Piedra—stone, rock.
Piloto—pilot, helmsman.
Pleamar—high water.
Pozo—well.
Piloto práctico, práctico—pilot.
Praia—beach.
Pueblo—town, village.
Puente—wharf, deck.
Puerto—port, harbor.
Punta—point.
Quinta—farm.
Rada—road.
Rama—ranch.
Recalada—landfall.
Reflujo—ebb.
Remolcador—tug.
Remolcamiento—tug.
Remolque—towage.
Restinga—reef.
Ría—rive mouth, arm of the sea.
Riachuelo—rivulet.
Ribera—bank.
Río—river.
Roco—rock.
Rojo—red.
Rota—course.
Rotura—a break, a split.
Rumbo—bearing, course.
Saco—sack, bay.
Salida—going out, exit.
Saliente—salient.

Salina—salt works.
Salir—to go out.
Salvavidas—life-saving apparatus.
Sanidad—health.
Seno—bosom, bay.
Sentido—direction.
Septentrional—northward.
Sierra—mountain chain.
Somero—shallow.
Sotavento—leeward.
Sur—south.
Temporal—storm.
Terral—land wind.
Tiempo—time weather.
Torre—tower.
Valiza—beacon.
Vapor—steam.
Varado—aground.
Varar—to strand.
Variaçion—variation.
Vela—sail.
Vendaval—southwest wind.
Verde—green.
Vermejo—red.
Viento—wind.
Vigía—lookout.
Villa—city.
Virazón—sea breeze.
Viscoso—slimy, tough.

*Names of points of the compass.*

| ENGLISH. | SPANISH. | ENGLISH. | SPANISH. |
|---|---|---|---|
| North | Norte. | South | Sud (Sur). |
| North by east | Norte cuarta al nordeste. | South by west | Sud cuarta al sudoeste. |
| North-northeast | Nornordeste. | South-southwest | Sud sudoeste. |
| Northeast by north | Nordeste cuarta al norte. | Southwest by south | Sudoeste cuarta al sud. |
| Northeast | Nordeste. | Southwest | Sudoeste. |
| Northeast by east | Nordeste cuarta al este. | Southwest by west | Sudoeste cuarta al oeste. |
| East-northeast | Esnordeste. | West-southwest | Oessudoeste. |
| East by north | Este cuarta al nordeste. | West by south | Oeste cuarta al sudoeste. |
| East | Este. | West | Oeste (ueste). |
| East by south | Este cuarta al sudeste. | West by north | Oeste cuarta al noroeste. |
| East-southeast | Este sueste. | West northwest | Oesnoroeste. |
| Southeast by east | Sudeste cuarta al este. | Northwest by west | Noroeste cuarte al oeste. |
| Southeast | Sudeste (Sueste). | Northwest | Noroeste (norueste). |
| Southeast by south | Sudeste cuarta al sud. | Northwest by north | Noroeste cuarta al norte. |
| South-southeast | Sud sudeste. | North northwest | Nornoroeste. |
| South by east | Sud cuarta al sudeste. | North by west | Norte cuarta al noroeste. |

REMARK.—The Spanish cuarta is abbreviated as c. or ¼.

# INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

## THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Tide Tables, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but are sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information from all parts of the world is published weekly in the Notices to Mariners.

The charts are always corrected for all available information up to the date of issue stamped upon them; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

**Charts.**—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are put on sale. Masters of vessels are urged to replace the old charts, which should be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corners.

The edition, and corresponding date, of the chart will be found in the right lower corner, outside the outer neat line.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (found in the lower right and upper left corners), in order that the edition of the chart referred to may be known.

**The Light Lists** are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the tabular form in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the sailing directions is not complete, and may be obsolete, in consequence of changes since publication.

**The Sailing Directions or Pilots** are kept corrected by addenda, and subsequent to date of last addenda they should be kept corrected by means of the Notices to Mariners. Sailing Directions issued to naval vessels carry with them an envelope containing slips of corrections up to date of issue.

Addenda are published from time to time, and contain a summary of all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

To enable the books to be more conveniently corrected, addenda and Notices to Mariners are printed on one side only, and two copies of the latter are issued to each naval vessel, one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

**The Tide Tables,** which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

**Notices to Mariners,** containing fresh information pertaining to to all parts of the world, are published weekly and mailed to all

United States ships in commission, branch hydrographic offices and agencies, and United States consulates. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice to naval vessels is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

**Pilot Charts** of the North Atlantic, Central American Waters, and North Pacific and Indian Oceans are published each month, and of the South Atlantic and South Pacific Oceans each quarter. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, routes for steam and sailing vessels for the period of issue, ice and derelicts for the preceding period, ocean currents and magnetic variation for the current year, storm tracks for preceding years, and much other useful information. They are furnished free only in exchange for marine data or observations.

**Hydrographic Bulletins,** published weekly, are supplemental to the Pilot Charts, and contain the latest reports of obstructions and dangers along the coast and principal ocean routes, ice, derelicts, and wreckage, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

## THE USE OF CHARTS.

**Accuracy of chart.**—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey, in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a chart founded on such a survey is tested it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so thorough as to make it certain that all dangers have been found. The number of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all the soundings that were obtained. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present,

such banks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

**Fathom curves a caution.**—Except in charts of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line or caution against unnecessarily approaching the shore or bank within that line, on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curve on rocky shores is another warning, especially for ships of heavy draft.

A useful danger curve will be obtained by tracing out with a colored pencil or ink the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the curves to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

**The chart on largest scale** should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

**Caution in using small-scale charts.**—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

**Distortion of printed charts.**—The paper on which charts are printed from engraved plates has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly varies with different papers and the amount of the damping; but it

does not affect navigation. The larger the chart the greater the amount of this distortion. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long.

**Mercator chart.**—Observed bearings are not identical with those measured on the Mercator chart (excepting only the bearings north and south, and east and west on the equator), because the line of sight, except as affected by refraction, is a straight line and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents not the arc of a great circle but the loxodromic curve, or rhumb line, which on the globe is a spiral approaching but never in theory reaching the pole, or, if the direction be east and west, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected, but in high latitudes, when the objects are very distant, and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the Mercator chart, which represent the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings of the chart are identical with observed bearings.

The Mercator projection is unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey.

**Notes on charts** should always be read with care, as they may give important information that can not be graphically represented.

**Buoys.**—Too much reliance should not be placed on buoys always maintaining their exact positions. They should therefore be regarded as warnings, and not as infallible navigational marks, especially when in exposed places and in the wintertime; and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

**Gas buoys.**—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if periodic, the apparatus may get out of order.

**Whistle and bell buoys** are sounded only by the action of the sea; therefore, in calm weather, they are less effective or may not sound.

**Lights.**—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height of eye can be ascertained by means of the table of distances of visibility due to height, published in the Light Lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be obtained from the standard compass when you lay down from aloft.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye, or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower or order, as stated in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

**Fog signals.**—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land, and may not be observed by the lighthouse keepers until upon them; a ship may have been for many hours in it, and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind, it may be thrown upward; a man aloft might then hear it though inaudible on deck.

The submarine bell system of fog signals is much more reliable than systems transmitting sound through the air, as sound traveling in water is not subject to the same disturbing influences; the fallibility of the lighthouse keeper is, however, about the same in all systems, so that caution should be observed even by vessels equipped with submarine bell receiving apparatus.

**Submarine bells** have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus may determine the approximate bearing of the signal.

These signals may be heard also on vessels not equipped with receiving apparatus by observers below the water line, but the bearing of the signal can not then be readily determined.

Vessels equipped with radio apparatus and submarine bell receivers may fix their distance from a light vessel having radio and submarine bell, utilizing the difference in velocity of sound waves of the radio and the bell. Sound travels 4,794 feet per second at 66° F. in water, and the travel of radio sound waves for practicable distances may be taken as instantaneous.

All vessels should observe the utmost caution in closing the land in fogs. The lead is the safest guide and should be faithfully used.

**Tides.**—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the low water is less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast, in enabling them to anticipate the effect of the tidal currents in setting them on or off shore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the Tide Tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Tables 2A and 2B for most of the principal tidal stations of the United States, given in Table 1, and for the subordinate stations of Table 3 by using them as directed in the Tide Tables. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

**Planes of reference.**[1]—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the Strait of Juan Fuca, it is the mean of the lower low waters; and from Puget Sound to Alaska, the plane employed on Hydrographic Office charts is low water ordinary springs.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or when-

[1] The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

ever not stated on the chart, the assumption that the reference plane is low water ordinary springs gives a larger margin of safety than mean low water.

Whichever plane of reference may be used for a chart, it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can not be depended upon and additional caution is necessary.

**Mean sea level.**—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide therefore corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The Tide Tables give in Table 3, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the Tide Tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

**Tidal streams.**—In navigating coasts where the tidal range is considerable, especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the times of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases:

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly; i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Countercurrents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard Sound and Buzzards Bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams is at about half tide.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

**Current arrows** on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

## FIXING POSITION.

**Sextant method.**—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor sextant angles between three well-defined objects on shore which are shown on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

For its successful employment it is necessary, first, that the objects be well chosen, and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice. Two observers are better for this method.

**Near objects** should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand, distant objects should be used for direction, because less affected by a small error or change of position.

**The three-arm protractor** or station pointer consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

**To plot a position,** the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

**The transparent xylonite protractor** is an excellent substitute for the brass instrument, and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The xylonite protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

**The value of a determination** depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. Such an observation is called a "revolver." An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range of two objects give in general an excellent fix, easily obtained and plotted.

**Advantages of sextant method.**—In many narrow waters where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

**The compass.**—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the pelorus, may be usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart is doubtful, the compass should be used in preference to the sextant.

In fixing by the compass, it should always be remembered that a position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

When the three lines do not intersect in a point, the following rule holds: If the line drawn to the middle object falls to the right of

the point of intersection of the lines to the two outside objects, the position of the observer was to the right of the line to the middle object; and if it falls to the left of the intersection his position was to the left of the line. Thus it will be seen that the assumption that the position is at the center of the triangle formed by the intersecting lines is incorrect.

**Doubling the angle on the bow.**—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards, the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

When the first bearing is 26½° from ahead, and the second 45°, the run between bearings will equal the distance at which the object will be passed abeam.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the Light Lists and in Bowditch.

**Danger angle.**—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plain right triangle; the natural cotangent of the angle multipled by the height in feet gives the distance in feet. The convenient use of this method, however, requires tables such as those published by Capt. Lecky in his little book entitled

"The Danger Angle and Offshore Distance Tables." This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles.

When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridans before being laid down on a Mercator chart. The correction may be found by the following formula, using the approximate position. The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing and its effect is always to increase the latitude of the observer.

**Soundings** taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart, keeping the line representing the track parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water without slowing down the ship and consequent loss of time.

**Pelorus.**—All ships should be supplied with the means of taking accurate bearings both by night and by day. The standard compass is not always conveniently placed for the purpose; in such case a pelorus will be very useful, but the results are not as accurate as those obtained direct from the compass. The utility of such an instrument in ascertaining the change of bearing of an approaching ship should not be overlooked.

**Position lines.**—Among the various methods of fixing position at sea, the one which should be best understood and put to the most constant use is that employing position or Sumner lines. These lines give the most comprehensive information to the navigator with the least expenditure of labor and time. The knowledge gained is that the vessel must be somewhere on the line, provided the data used is accurate and the chronometer correct. As the information given by one line of position is not sufficient to determine the definite location of the vessel, it is necessary to cross this line by another

similarly obtained, and the vessel being somewhere on both must be at their intersection. However, a single line at times will furnish the mariner with invaluable information; for instance, if it is directed toward the coast, it marks the bearing of a definite point on the shore, or if parallel to the coast it clearly indicates the distance off, and so will often be found useful as a course. A sounding taken at the same time with the observation will in certain conditions prove of great value in giving an approximate position on the line.

The easiest and quickest way to establish a line of position is by employing the method of Marcq St. Hilaire, as modified by the use of tables of altitude. The principle of this method is one of altitude differences, in which the observed altitude is compared with the computed altitude for a dead reckoning, or other selected position, and the difference in minutes of latitude measured toward the body along the line of its azimuth, if the observed altitude is greater than the computed altitude, and vice versa. A line drawn at right angles to the line of azimuth through the point thus determined is the position line, somewhere upon which will be found the position of the vessel. The tables of altitude obviate the computation of the altitude and thereby greatly facilitate the establishment of the line.

A position line may also be found by computing two positions for longitude with two assumed latitudes, and drawing the line between them; or by drawing to the position obtained with one latitude a line at right angles to the bearing of the body as taken from the azimuth tables.

A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The position lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterwards or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation, and correspondingly restricting the dead reckoning uncertainties of the night. An early morning fix in particular is often of great value. Though the same degree of accuracy as at twilight can not be expected, night observations are very valuable and should be assiduously practiced.

**Piloting.**—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and sailing directions, and should select what appear to be the most suitable marks for use, also providing himself with substitutes to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. Channel buoys seen from a distance are difficult to identify, because their color is sometimes not easily distinguished and they may appear equally distant from the observer even though they be at widely varying distances. Ranges should be noted, if possible, and the lines drawn both for leading through the best water in channels and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble from bad steering at critical points.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others are unmistakably identified.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be immediately required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when it is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times, the speed of the ship, and the set of the current; failure to make a buoy as expected leaves, as a rule, no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

In passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the

main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida Keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid bad steering, which in narrow channels is a very positive source of danger.

**Coast piloting** involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well-surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the position, rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing, in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus should be at all times in readi-

ness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent-log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

**Change in the variation of the compass.**[1]—The gradual change in the variation must not be forgotten in laying down on the chart courses and bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are re-engraved once in 10 years; more frequent alterations on one spot in a copperplate would not be practicable.

The change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

**Local magnetic disturbance of the compass on board ship.**—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local

[1] See H. O. Chart No. 2406, Variation of the Compass.

center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

**Use of oil for modifying the effect of breaking waves.**—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships, especially of the smaller classes, and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when no other oil is obtainable, or it may be mixed with other oils; all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. In cold water, the oil, being thickened by the low temperature and not being able to spread freely, will have its effect much reduced, a rapid-spreading oil should be used.

5. A small quantity of oil suffices if applied in such a manner as to spread to windward.

6. It is useful in a ship or boat either when running or lying-to or in wearing.

7. When lowering and hoisting boats in a heavy sea the use of oil has been found greatly to facilitate the operation.

8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to permit leakage. The waste pipes forward are also very useful for this purpose.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside, bearing in mind that her natural tendency is always to forge ahead. If she is aground the effect of oil will depend upon attending circumstances.

11. For a boat riding in bad weather to a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling, if necessary.

# CHAPTER I.

## GENERAL DESCRIPTION OF THE REGIONS INCLUDED IN THIS VOLUME — GENERAL REMARKS, INCLUDING WEATHER AND WINDS, CURRENTS AND TIDES, COMMUNICATIONS, PASSAGES, ETC.

**General remarks.**—South America Pilot, Volume II, contains a description of the coasts of South America from Cape San Antonio, the southern entrance point of the Plata River, on the east coast, to Corcovado Gulf on the west coast, including Tierra del Fuego and adjacent islands, and Magellan Strait; it also describes the Falkland Islands, South Georgia, Sandwich, South Shetland, and South Orkney Islands, and the region known as Antarctic South America. A general description of the territory, its climate, etc., is given in this chapter, together with general directions for making various passages. Detailed directions and description will be found in the chapter in which the particular territory is treated.

**Argentine Republic.**—The Argentine Republic is bounded on the north by Paraguay, Bolivia, and Brazil; on the west and south by Chile, and on the east by Brazil, Uruguay, and the Atlantic Ocean.

Its territory reaches from the slopes of the Andes to the Uruguay River, and from the basin of the Pilcomayo River, on the borders of Bolivia, southward for a distance of 1,200 miles, to Beagle Channel in Tierra del Fuego; it is estimated to contain 1,117,059 square miles.

**Government.**—The country was discovered in 1517 and settled by the Spaniards in 1535, and next to Brazil it is the largest State of South America, having 14 Provinces and 10 territories with a large seaboard on the east coast of South America. By a treaty with Chile of July 23, 1881, Patagonia and Tierra del Fuego were divided between these two Republics.

The Provinces of the Republic are Buenos Aires, Sante Fe, Entre Rios, Corrientes, Cordoba, Santiago del Estero, Tucuman, Salta, Jujuy, Catamarca, La Rioja, San Luis, Mendoza, and San Juan.

The territories are: Misiones, Formosa, El Chaco, Los Andes, Pampas, Rio Negro, Neuquen, Chubut, Santa Cruz, and Tierra del Fuego, the last three of which will be described under Patagonia.

With the exception of the northwest part of the Argentine Republic, where the spurs of the Andes reach down to the State, the surface of the country presents vast level plains, broken only by the detached ridges of Cordoba and San Luis in the western interior. In the central and southern regions the treeless plains or pampas are covered at most seasons with coarse grass, which is green during the winter months, but dries up in the summer, and gives an aspect of aridity to the plains. Some portions of the interior, named Salinas, are barren and white throughout the year.

**Rivers.**—The two principal rivers in the Argentine territory described in this volume are the Colorado and the Negro. The Colorado, one of the great streams of the south, rises in the Andes, and after a long southwesterly course enters the sea south of Bahia Blanca. The Negro is formed of two confluent streams: the northern, named Neuquen, rises in the Andes south of Mendoza; the southern, the Limay, flows out of Lake Nahuel Huapi and runs northerly about 140 miles and then southeasterly 500 miles to its mouth in latitude 41° south.

**Standard time.**—The meridian of Cordoba has been adopted as a standard for the purpose of regulating time for the Argentine Provinces; it is 4 hours 16 minutes 48.2 seconds slow on Greenwich mean time.

**Patagonia** extends from the Rio Negro to Magellan Strait. The boundary line dividing this territory between the Argentine and Chilean Republics, by the treaty concluded with Chile in 1881, starts from Dungeness, the northeastern entrance point of Magellan Strait, passes in a curved line through Monte Dinero, and by the highest ridges to Monte Aymond, thence to the intersection of the meridian 70° west with the parallel of 52° south, from which it extends to the watershed of the Andes.

**Government.**—Patagonia is divided into the Territories of Chubut, Santa Cruz, and Tierra del Fuego.

Toward the Pacific, Patagonia is bordered by the southern Andes, many of the peaks of which are volcanoes. Toward the Atlantic the long eastward slope of Patagonia presents a succession of bare plains, grass covered in parts like the Argentine pampas. Several rivers, the largest of which are Rio Negro, the Chupat, the Chico, the Santa Cruz, and the Gallegos, flow across the eastern slope to the Atlantic.

**Geology.**—East of the Andes for the most part the country is a region of vast steppelike plains, covered with an enormous bed of shingle, overgrown with thorny brushwood and herbage. This is the largest tract of shingle in the world, and has been characterized by geologis s as the Patagonian formation, and is of Tertiary origin.

Beneath the shingle, sometimes 200 feet in thickness and cemented together by an aluminous substance, there stretches a vast deposit, in some places more than 800 feet thick, of soft infusorial stone resembling chalk. It is assumed that the Atlantic and Pacific Oceans were once connected, through what is at present, the bed of the Santa Cruz River.

**Flora and fauna.**—The most ordinary bushes are the jume (*Salicornia*), containing a large quantity of soda, and the calafete (*Berberis buxifolia*) making good fuel, and bearing what explorers have named magellans grape. The perennial herbs are (*Strongyloma struithum*), Chuquiragas, Adesmias, and Azorellos; the supposed palm tree, growing on the south coast, is a species of fern (*Lomaria boryana*).

The guanaco, the puma, the zorro or (*Canis azaræ*), a kind of fox, the zorrino or (*Mephtis patagonica*), a species of skunk, and the tuco- tuco or (*Ctenomys magellanicus*), a kind of rodent, are the most characteristic mammals of the Patagonian Plains. Cavies or Patagonian hares (*Dolishotis patachonica*), are common, also the ciervo or red deer (*Cervus paludosus*) and the gama or camp deer (*Cervus campestris*), the latter being somewhat larger than a roe deer.

The ostrich (*Rhea americana*), and the more rare *Rhea darwinii*, form the chief means of subsistence of the native tribes. The carraucha or carrion hawk (*Polyborus tharus*) and the long-tailed green parraquets (*Conurus cyanalysius*) are common, and humming birds may be seen flying among falling snow; flamingoes and upland geese are also found.

The crested partridge or copeton is generally distributed along the coast of Patagonia; black necked and white swans are abundant; and the three edible species of geese consist of the upland (*Bernicla dispar*), the ashy headed (*B. poliocephala*), and the rufous-headed goose (*Chloëphaga rubidiceps*).

**Population.**—The Patagonia Indians are very few in number in comparison with the vast extent of country over which they wander. The Tehuelches, or southern Indians, are tall, fine people, nomadic hunters of the guanaco and ostrich. The northwest part is occupied by the Manzanas, a less nomadic people, possessing herds of cattle, flocks of sheep, and allied in language to the Araucanians of southern Chile on the opposite slopes of the Andes.

**Products.**—Wheat is grown in a small district situated on both sides of the mouth of the Rio Negro, also at the Welsh colony of Chubut; but owing to the small rainfall, which in some years, does not exceed 6 inches, extensive irrigation works were found to be necessary, and the irrigated soil is said to be extremely fertile.

**Communication.**—There is telegraphic communication between all ports from Buenos Aires to Dungeness Point and Punta Arenas, and steamship communication with all parts of the world.

**Climate.**—The climate of southern Patagonia is very severe; the streams are frozen over till September, and the winter winds blow over the bare plains, driving clouds of snow and sand with great violence.

**South Patagonia and the islands** includes the region embracing the Strait of Magellan and the Patagonian channels westward of it, with the mainland and islands bordering on them.

Mountainous and rocky, intersected by deep and tortuous fiords of a complexity unsurpassed elsewhere, and with a climate more continuously tempestuous and rainy than any other part of the world, the greater part of the Magellanic area is inhabited by savages of the lowest civilization and offers but few inducements to the European beyond the facilities the channels afford for smooth-water passage from the Atlantic to the Pacific.

Eastward, however, of the point where the main backbone of the Cordelleras enters Magellan Strait, at Cape Forward, the vastly improved character of the soil, as also of the climate in dryness and sunshine, enables agriculture of certain kinds and sheep farming to be carried on; and at Punta Arenas (Sandy Point) is a town of 10,000 inhabitants, where coal and supplies may be obtained.

**Tierra del Fuego.**—See Chapter VI for description.

**Productions.**—The northern parts of Tierra del Fuego enjoy a somewhat more genial climate than the southern, but even in the latter there are extensive plains covered with a variety of grasses forming a fair pasture country. In the northeast part of the island, between Useless Bay and the Atlantic Shore, there are extensive forests of beech, among which a fine cyprus is not uncommon. To the southwest of Useless Bay, however, the area under timber is not large. The foot and lower slopes of most of the hills are covered with a more or less dense growth of bushes. Lichens abound on the heights towards the west, as well as on some arid areas where nothing else appears to thrive. There are but five species of quadrupeds found on the island, viz, the guanaco, the dog, the tuco-tuco, a fox, and a small rat. Birds are numerous, most of them being fit for food.

**Geology.**—Lines of cliffs bearing unmistakable traces of wave action at no very remote period occur in several parts more or less removed from the present high-water mark, notably near Cape Sunday, where they extend far inland on the borders of the Cullen Valley, and again south of San Sebastian Bay. Erratic bowlders are exceedingly common all over the island; they are usually of granite,

syenite, and gneiss, sometimes with quartz veins. Although generally confined to the plains these blocks are frequently found at elevations over 300 feet above the sea. The whole of the rocks of the island appear to be of the Tertiary period; they are large, stratified masses, associated with sandstone, sometimes laminated, and covered with a layer of 5 to 20 feet of coarse gravel or pebbles of an angular shape. Extensive beds of dark blue sand, principally composed of magnetite; and small rubies and garnets are frequently met. Gold is the only metal that has as yet been discovered in Tierra del Fuego.

**Climate.**—The prevailing weather of Tierra del Fuego is, like all this region, stormy; but the height of the mountains to the west and the direction of the prevailing winds make it fairly dry in the eastern parts; the southern portion, being more open to the winds, has, though it is not so wet as the islands to the westward, more than a sufficiency of rain.

The temperature is low and very equable, never rising to warmth or falling to excessive cold.

**Natives.**—The natives of Tierra del Fuego are known as Onas; they appear to be an intermediate race between the large-sized Patagonians and the stunted Fuegians; they have no canoes and live largely on the produce of hunting; they are rapidly decreasing in number, and there are now (1903) estimated to be only about 600 remaining.

The natives of the Beagle Channel and the islands to the southward are known as Yahgans; they pass most of their time in their canoes; like the Onas they are a dwindling race and now number only 200.

**Mission station, etc.**—The South American Missionary Society has a mission station at Rio Douglas, on the southwest coast of Navarin Island. Mr. Lawrence, formerly resident missionary at Ushuwaia, is now settled at Remolino Point, on the northern shore of the Beagle Channel; and in addition, the Messrs. Bridges have a large sheep station at Harberton, on the same coast. Settlers will also be found along the eastern shore of Tierra del Fuego, from Cape San Sebastian to Polycarp Cove. These settlements will afford refuge and relief to mariners shipwrecked hereabouts.

Owing to the influence of the missionaries a great change has been effected in the character of the natives generally, and the Yahgan natives, from Cape San Diego to Cape Horn and thence around to Brecknock Peninsula, can be trusted to conduct shipwrecked mariners to the mission stations or to the settlements in the archipelago, where assistance may be obtained. Most of the natives speak English.

The natives of New Years Sound also are in friendly communication with the mission station at Rio Douglas, and all the natives

around Nassau Bay and in the Beagle Channel would, in all probability, assist shipwrecked mariners to the nearest settlement.

Should a vessel be abandoned to the westward of Cape Horn, the boats should endeavor to reach Tekenika. If circumstances prevent their passing between Hardy Peninsula and Hermite Islands and they are driven to leeward, the best course will be east of Navarin Island for the Beagle Channel.

Should it be advisable, boats may proceed to the head of the Romanche Channel, where there is a pass over the mountains to Tekenika.

**The Patagonian Archipelago,** the range of islands lying west of Tierra del Fuego and stretching along the western coast of Patagonia for 11° of latitude north of the western entrance to Magellan Strait, is about as inhospitable a land as is to be found in the globe, especially in its more southern parts. The land is mountainous, presenting an alternation of matted forest, bare rock, and deep bogs, and is cut up by deep channels into peninsulas and islands whose forms are yet very imperfectly known. Drenching rains, varied by snow and sleet, prevail throughout the year, while furious westerly gales succeed each other with rapidity. The scenery is magnificently stern, but is seldom seen to advantage, the clouds and mists usually screening the higher peaks and snow fields. Glaciers, however, extend in many places either nearly or quite to the level of the sea.

In such a climate life is scarce, sea fowl and a few wild fowl being the main representatives of the animal kingdom.

**Rainfall.**—The rainfall has never been accurately measured throughout the year, but from the records kept by various surveying vessels, as probably about 150 inches.

**Natives.**—The canoe Fuegians proper (Alacalufs), living west of Tierra del Fuego in the inlets opening into the western part of Magellan Strait, though not so low a type of humanity as some other savages, are probably less advanced in civilization than any. In such a climate, with no prospects of agriculture and with no land animals to chase, they have little chance of advancement. They are practically unclothed, and spend their time in wandering from one cove to another catching mussels and fishing. Their canoes are the largest of any on the South American coast, and will often hold from 20 to 30 people. The have no fixed habitations, and merely build wigwams of boughs. They are harmless and inoffensive so long as their womenkind are not interfered with.

**The Falkland Islands,** belonging to Great Britain, form a group consisting altogether of above 100 islands. They lie about 350 miles eastward of Magellan Strait, between 51° and 52½° south and 57½° and 61½° west.

These islands were seen by Davis in 1592, in Cavendish's second voyage, and visited by Hawkins in 1594. In 1690 Strong sailed through the channel which separates the islands and named it Falkland Sound, which name was afterwards given to the whole group. In 1710 a French vessel from St. Malo touched at the islands and named them Iles Malouines. Settlements were afterwards made by the French, the Spaniards (who term the group "Malvinas"), and the English, successively, which accounts for the foreign names of some of the ports and harbors. Great Britain has ultimately remained in possession.

East and West Falkland, the two islands of considerable size, are separated from each other by a sound varying in width between 2½ and 18 miles. The whole group comprises an area of 6,500 square miles and is indented in a remarkable manner by sounds and bays, which form excellent harbors.

Nearly all the islands of any size are inhabited. The positions of the settlements are shown on the charts, and this knowledge would be invaluable to shipwrecked mariners seeking relief.

The government is administered by the governor, who resides at Stanley, aided by an executive council and a legislative council. The members of both councils are appointed by the Crown.

South Georgia, South Shetlands, South Orkneys, Sandwich Islands, and Graham Land are dependencies of the Falkland Islands.

**The aspect** of the Falkland Islands is not striking. Ridges of rocky hills above 1,000 feet high are seen traversing extensive tracts of moorland without a tree and bounded by a low rocky coast. On the northern part of East Falkland the hills attain a considerable elevation, but all the south portion is so low that it can barely be seen from the deck of a ship at 5 miles. Wickham Heights, the principal range of hills, stretch east and west and culminate in Mount Usborne, 2,245 feet high, near the western extremity.

The western island is slightly greater in average height than the eastern, the highest peak, Mount Adam, in the northwestern part of the island, being 2,290 feet high. On the western face of the island and on some of the adjoining islets are some precipitous cliffs, exposed to the fury of the western seas. The rugged summits of the hills and mountains terminate in points and ridges, being seldom rounded and never tabular.

**Geology.**—The more elevated parts of East Falkland are composed of quartz rocks. Clay slate prevails in the intermediate districts. Sandstone, in which are beautifully perfect impressions of shells, occurs in beds within the slate formation and upon the slate is a layer of clay suitable for making bricks.

A peculiar feature in the geology of these islands is presented in streams of stones or fragments of quartz, which appear to flow down

the sides of the hills. These streams are from 20 to 30 feet wide, and the stones, varying in size from 1 to 4 cubic feet, are spread out in the valleys to a great extent.

The soil of the islands is chiefly peat, but near the surface, where the clay is of a lighter quality and mixed with vegetable remains, it is good and suitable for cultivation. Stone of two or three kinds for building purposes may be found in different parts of the islands. Lime may be obtained by burning the fossil shells brought from the coast of Patagonia, where the cliffs are full of them, or the shells collected on the Falkland shores.

**Flora and fauna.**—A remarkable feature in the botany of the Falkland Islands is the entire want of trees; but there is a great variety of sweet-scented flowers, which in November and December nearly cover the ground. The tussac grass, a gigantic sedgy grass, with blades 7 feet long and three-fourths inch wide, was formerly abundant on the mosses, but. since the importation of cattle, has disappeared except on the detached islets and where fenced.

Antiscorbutic plants are very plentiful in a wild state, such as celery, scurvy grass, sorrel, etc. There are also cranberries and what the settlers call strawberries, a small red fruit growing like the strawberry, but in appearance and taste more like the half-ripe blackberry.

A little plant that grows like a heath in many parts of the Falklands, as well as in Tierra del Fuego, has long been known and used by the sealers as a tea plant; it has at first on some people a peculiar effect, which is of no consequence as it soon goes. Potatoes and other vegetables are grown, but are not usually plentiful.

The three edible geese found in Patagonia also frequent the Falkland Islands. The Falkland snipe, *Scolopax frenata*, is a solitary bird, nearly as large as the woodcock.

Seals and sea elephants were abundant in former years, but were much reduced by indiscriminate slaughter; steps have been taken for their preservation. Fish swarm in every harbor during the summer months, and excellent trout are to be caught in the lakes. Mussels and clams abound.

Whales frequent the surrounding waters at particular seasons, though their numbers are much reduced.

Cod fishing might be turned to good advantage by the inhabitants of the Falkland Islands.

**Population.**—The estimated population in 1913 was 3,223.

**Products.**—Sheep farming is the chief industry, and wool the principal article of export, the output being on the increase.

Animals increase here rapidly, and the quality of their hides or fur improves. It must be remembered that cattle are no longer wild, but are the property of some owner, and there is a penalty for shoot-

ing them. Horses, pigs, cattle, hares, rabbits, snipe, geese, and duck are plentiful; sheep have been introduced and found to do exceedingly well.

**Trade.**—The other exports are live sheep, hides and tallow, sheep and seal skins. The imports consist principally of groceries and provisions, clothing material, hardware, coal, machinery, and oilmen's stores, wines, spirits, ships' stores, and cordage.

**Ports.**—Stanley is the principal port, but excellent harbors, easy of access, affording good shelter, with the very best holding ground, are formed by the remarkable indentations of the coasts which abound among those islands; with due care they offer ample protection from the frequent gales.

Should any accident happen to a vessel in doubling Cape Horn, obliging her to make for the nearest port at which she could obtain supplies, she would find all she required at the Falkland Islands.

**Communications.**—The mails are carried by the steam vessels of the Pacific Steam Navigation Co. which call at Stanley once every four weeks, outward and homeward, on their passage between Liverpool and Calao. The mails between Stanley and other parts of the colony are conveyed on horseback and by local steamers.

**Climate.**—The climate of the Falkland Islands (Stanley) is much the same all the year round as regards temperature. The winter is, of course, the colder; but cold weather and frosts occasionally occur in summer, and snow is not uncommon. The climate is exceedingly healthy and no disease whatever has been hitherto contracted excepting ordinary colds and coughs, or rheumatic affections brought on by unusual exposure to the weather.

By those who have had experience, the climate of West Falkland is considered milder than that of the eastern island; probably the west winds are chilled in passing over the heights, becoming on reaching Stanley Harbor several degrees colder than on first striking the western islands.

**Caution.**—Water found in pools about the islands should be avoided for drinking purposes. Its use has caused loss of life to those out on shooting excursions.

**Kelp.**—In approaching any part of the Falkland Islands, and especially while entering a harbor, a careful lookout should be kept for fixed kelp, the seaweed that grows on almost every rock covered by the sea and not very far beneath its surface. Lying upon the water, the upper leaves and stalks show almost as well as buoys where there is a possibility of hidden danger. Long stems with leaves lying regularly along the surface of the sea are generally attached to rocky places or to large stones.

In passing to windward of patches or beds of kelp, or rather in passing on that side from which the stems stream away with the cur-

rent, care should be taken to give the place a wide berth, because the only part that shows when the tide is strong lies on one side of, not over, the rocks.

Where the stream of tide is very strong, the kelp is quite run under, or kept down out of sight, and can no longer be depended on as a warning. A clear spot in the middle of a thick patch of fixed kelp generally indicates that there the least water will be found.

In general, danger will be avoided by keeping clear of kelp, but this must not prevent attention to the lead, as the rule sometimes fails. If the entrance of a port can not be gained by good daylight, a vessel should stand off again, as the kelp is the only true guide in entering.

**Drift kelp,** or that which is floating on the surface of the sea, unattached to any rock or stone, may generally be known by its irregular, huddled look.

**Tides and tidal streams.**—The tidal streams differ much as to strength and directions in different parts of this group, but the times of high water, full, and change, are between 5 and 8 h.; the range is similar everywhere, about 8 feet at springs and 4 feet at neaps, but there is a considerable diurnal inequality.

The great tidal wave which causes the streams among these islands, comes from the southeast and splits off Lively Island, one part of the flood stream running northward and the other southwestward past Sea Lion Islands, with a rate of 1 to 2 knots an hour near the shore. Along the south, west, and north shores it increases in strength until among the Jason Islands on the northwest side it runs 6 knots an hour, causing heavy and dangerous races. Into Falkland Sound the flood stream enters at both ends, meeting near the Swan Islands and causing a double high water.

**Currents.**—Besides these movements of the surrounding waters there is a current setting past the islands from southwest to northeast. All parts of the southern shores that are open to the southwest are covered with trees that have drifted from Staten Island or Tierra del Fuego. Great quantities of this driftwood may be found between Cape Orford and Choiseul Bay, a stretch of coast where a vessel may not otherwise find a good supply of fuel. On Breaker Island and in the bays behind the southern Sea Lion Islands portions of Fuegoan canoes have often been found.

At sea, when northeastward of the Falklands, great quantities of drift kelp are seen, besides water-worn trunks and branches of trees, near which are generally fish and numbers of birds. These sure indications of a current from the southwest have been met with upward of 200 miles from the islands. It is not supposed that the current ever runs more than 2 knots an hour under any circumstances, and its usual set is probably even less than 1 knot.

During and after long-continued southeasterly gales, when a heavy sea rolls in on the south and southeast coasts of the Falkland Islands, there is stated to be a strong set to the northwest, to which set has been attributed the loss of several vessels in the neighborhood of Bull Point. Vessels from Cape Horn intending to sight Beauchene Island should therefore make due allowance against a possible set of 20 to 30 miles a day to the northwestward.

**Ice.**—In the area to the southward, eastward, and northeast of the Falkland Islands large numbers of icebergs are sometimes met with. Ice islands upward of 20 miles in length were frequently seen in the years 1892 and 1893 between the parallels of 40° and 52° south latitude and the meridians of 30° and 50° west longitude, and were met with as far west as 61° west longitude. On November 8, 1908, the *Elieser* reported two large bergs in latitude 37° 30′ south, longitude 43° 50′ west.

Vessels have been lost by being crushed in this ice, and it is evident that this area should be navigated with great caution.

**Islands and rocks southeast of the Falklands.**—A description of the South Shetlands and Orkneys, etc., and of antartic South America will be found in Chapter V.

## WINDS AND WEATHER.

**From the Plata River to Magellan Strait** westerly winds prevail throughout the year and generally bring fine weather. From September to June the westerly winds are often interrupted at full and change of the moon by southeast gales, accompanied by rain, thick weather, and a heavy sea. Easterly winds bring rain and sometimes fog.

Severe gales, with a cross and turbulent sea, are frequently encountered southeastward of the Plata River, at 200 and 300 miles from the coast. As these gales are often experienced in a region where sudden changes in temperature are observed the bad weather may be attributed to the meeting of the warm Brazil and the cold Cape Horn current.

On the coast between the parallels of 40° and 50° south latitude much uniformity of weather prevails, these 10° of latitude causing less variation in temperature than would be supposed. The winds are also more regular than those about the Plata River, and as the quantity of rain that falls during the year is beyond comparison less, the climate is as warm at least as that of Buenos Aires, and so very dry that the land is generally parched and sterile, except near rivers.

In some ports on this coast, San Blas, the Oven, San Antonio, and others, it is ruinous for a ship to lie moored during many sum-

mer months; even weeks of delay are injurious, so powerful is the effect of the rarely clouded sun acting throughout the whole day upon the woodwork, with no moisture, even by dew.

In winter there are sometimes sharp frosts at night, but they do not continue through the day. Snow is rarely seen; hail with southerly winds is common and very large. During the summer months, while the air is in a settled state, the wind generally backs around the compass during the 24 hours, a moderately fresh sea breeze from the southeast in the afternoon being succeeded by a land wind of similar strength from the northwest during the night; light winds or calms prevail in the mornings and evenings.

In settled weather the wind always goes around from east to west by north; when it takes the opposite direction bad weather usually follows. Gales from the southeast occur once or twice in a month, and generally, it is said, about the full or change of the moon. In summer, November to May, these gales, which are heavy and sometimes accompanied by rain and thick weather, are very much felt on the coast, as they send a heavy sea into the harbors.

Other strong winds blow chiefly from the land, and bring clear pleasant weather; northeast winds sometimes bring rain, but rarely, if ever, increase to the strength of a gale. During the winter season, May to November, southerly winds are more frequent and last longer than in summer; more rain is brought at that time by winds from northeast and southeast, but the latter wind is not usually so strong as in summer.

On this part of the coast, as well as in the Plata River and about Tierra del Fuego, bad weather with northerly winds will continue until the wind shifts to the southward, going around by the west. Squalls or gales of more or less strength from southwest to south-southeast soon clear the air, and the greater the duration and strength of the southerly wind, the finer and more lasting will the weather be afterward. These southerly winds are dry, cold, and elastic; they cause the mercury in a barometer to rise unusually high, and have very beneficial effects upon the human frame.

With northerly and westerly winds there is at times much lightning and thunder, particularly during the warm weather. Winds from the northward begin and increase gradually; those from the southward are sudden, and at times instantaneously violent. Vessels should be always ready for a sudden shift to the southward, when the barometer is low, with a northerly wind blowing and the weather threatening.

Westerly winds are the most prevalent throughout the year, and generally bring clear, fine weather. Gales of wind sometimes begin

from the northeast while the mercury in the barometer is high; if moderate at first, the wind generally increases and draws to the northward, as the mercury falls, until it reaches north and northwest, when it blows hardest. Having continued to blow for 12 or 24 hours it moderates, perhaps falls entirely, particularly if there be rain, and in a few hours afterwards shifts to the southward, quickly increasing to a gale which will be strong in proportion to that which preceded it; or perhaps it may shift suddenly in a squall to the southward, and blow with violence.

The rising of the mercury always precedes, by an interval more or less short, this change from a northerly to a southerly wind. Northerly gales are preceded by gloomy overcast weather, by numerous small clouds apparently very high in the air (cumulo-strati and cirro-cumuli) sometimes by a mistiness or a thick haze, and sometimes by much lightning. Southerly gales may be foretold by large masses of heavy clouds with hard defined edges (cumuli) rising in the southern horizon.

Table showing the percentages of the most prevalent winds, during the several months of the year, in the locality of three areas in the direct route between Capes Corrientes and Virgins:

| Month. | South of Cape Corrientes. | | Northeast of Cape Three Points. | | Entrance to Magellan Strait. | |
|---|---|---|---|---|---|---|
| | Direction. | Per cent. | Direction. | Per cent. | Direction. | Per cent. |
| January | NNW. | 10 | WNW. | 12 | SW. | 14 |
| February | North. | 13 | North. | 15 | WSW. | 22 |
| March | NW. | 12 | NNW. | 16 | WNW. | 15 |
| April | SW. | 17 | NW. | 13 | WSW. | 25 |
| May | NW. | 15 | SW. | 13 | WSW. | 22 |
| June | NNW. | 17 | NW. | 13 | NW. | 17 |
| July | West. | 11 | WSW. | 15 | NW. | 14 |
| August | WNW. | 20 | SSW. | 12 | NW. | 15 |
| September | SSE. | 10 | North. | 11 | WSW. | 33 |
| October | NW. | 12 | North. | 11 | West. | 18 |
| November | South. | 14 | WNW. | 12 | WNW. | 22 |
| December | North. | 10 | North, West, and SW. | 10 | West. | 24 |

**Barometer.**—Very thick, gloomy weather, with northerly winds, and perhaps rain, with lightning and thunder, is sure to end in a sudden shift of wind to the southward. If the mercury be low, say, about 29.60 in a barometer averaging 30 inches in settled weather, a gale may be expected. After falling, the mercury will rise shortly before the wind shifts, and therefore the time when the mercury ceases to fall and begins to rise should be carefully noted. The mercury rises higher with southeast than with southwest winds. Northerly winds cause the mercury to fall. It falls most with the wind from north-northwest and rises with winds from the southeast.

During settled clear weather a southeast wind will raise the mercury to near 30.50 inches. With weather equally settled and apparently equally clear, a northwest wind will depress it to 29.80.

**Fogs.**—With moderate northwesterly winds dense fogs have been experienced from February to October, inclusive, between latitude 46° south, longitude 68° west, and latitude 38° south, longitude 52° west. On each occasion the fog cleared when the wind shifted to the southward of west. Fogs occur during the winter months, but are neither frequent nor of long duration.

**Squalls** are less numerous and give more warning than in most other parts of the world, but when they do rise they are not to be trifled with. Those from the southward sometimes require nearly all sail to be taken in; and if the barometer has been very low, and the clouds look very heavy, and no light can be seen underneath them, it will be prudent to furl almost every sail, and even to run before the first heavy blast, which seldom lasts many minutes. If attention be not paid to this advice, dearly bought experience will soon teach the propriety of this cautious prudence, especially to those who navigate small sailing vessels in this locality.

**Tierra del Fuego.**—See Chapter VI.

**Magellan Strait.**—See Chapter VII.

**Falkland Islands.**—Wind is the principal evil at the Falklands; a region more exposed to storms, both in summer and winter, it would be difficult to mention. The winds are variable, seldom at rest while the sun is above the horizon, and at times very violent. During the summer a calm day is an extraordinary event. Generally speaking, the nights are less windy than the days, but neither by night nor by day nor at any season of the year are these islands exempt from sudden and severe squalls or from gales which blow heavily, though not usually lasting many hours.

The prevalent direction of the wind is westerly. Gales in general begin at northwest and draw or fly around to the southwest, and it may be remarked that when rain accompanies a northwest wind it soon shifts into the southwest quarter and blows hard. Northerly winds bring cloudy weather, and when very light are often accompanied by a thick fog. It is also worthy of notice that they almost always occur about the full and change of the moon.

Northeast and northerly winds bring gloomy overcast weather, with much rain. Sometimes they blow hard and hang in the north-northeast, accompanied by thunder and rain, but more commonly draw around to the westward. Southeasterly winds also bring rain. They are not frequent, but blow hard, and as the gale increases it hauls to the southward.

During winter the winds are chiefly from the northwest; in summer more frequently from the southwest. Though fogs occur with light easterly or northerly winds, they do not often last through the day. Gales of wind, as well as squalls, are more sudden and blow more furiously from the southern quarter, between southwest and southeast, than from any other direction.

Wind from the east is rarely lasting or strong. It generally brings fine weather, and may be expected in April, May, June, and July rather than at other times; but intervals of fine weather (short, indeed), with light breezes from east-southeast to east-northeast, occur occasionally throughout the year. Neither lightning nor thunder are at all common; but when the former occurs easterly wind is expected to follow.

If lightning should be seen in the southeast while the barometer is low, a hard gale from that quarter may be expected. Southeast and southerly gales last longer than those from the westward, and they throw a very heavy sea upon the southern shores. In the winter there is not generally so much wind as in the summer, and the weather, though colder, is more settled and considerably drier.

One year's observations at Stanley give the following percentages of westerly winds for the several months of the year: January, 32; February, 32; March, 40; April, 57; May, 43; June, 46; July, 44; August, 50; September, 55; October, 35; November, 28 (while south winds were 38); December, 25.

**Barometer.**—Every material change in the weather in the vicinity of these islands is foretold by the barometer if its movements are tolerably understood and if frequently observed.

**Cape Horn and West Coast—General remarks.**—The winds which prevail on the western seaboard of South America and off Cape Horn depend apparently on three factors.

1. A uniformly low-pressure area in the South Shetland Isles and over the Antarctic region generally;

2. A constant high-pressure system in the South Pacific Ocean, which occupies an area extending from about the parallel of 15° south to that of 40° south latitude, between the meridians of 80° and 140° west longitude; and

3. To the high mountainous range of the Cordilleras, which runs close along the western coast of South America from the Isthmus of Panama to the Strait of Magellan.

Applying the known relations of wind to areas of atmospheric pressure in the southern hemisphere, viz, that around areas of low pressure, the wind has a tendency to revolve with the hands of a watch, and around areas of high pressure against the hands of a watch (face uppermost); and also to the fact that the direction of

the wind is greatly influenced by mountain ranges, or valleys, it is readily understood that the general direction of the wind to the southward of the area of high atmospheric pressure in the South Pacific is from the westward, until, striking against the Cordilleras, part of it is diverted to the northward along the eastern edge of the high-pressure system, and part to the southward toward the prevalent cyclonic system of the Antarctic, thus forming what are well known to be the prevailing winds on the South American western coasts, viz, southerly winds from about 40° south latitude to the Galapagos Islands, and northwesterly winds from 40° south to Cape Horn.

The line of separation between these prevailing southerly and northerly winds is not constant at about 40° south latitude, for the southern edge of the high-pressure system in the South Pacific varies somewhat in position, being a little to the southward of its mean latitude during the southern summer, and a little to the northward during the southern winter; consequently the northerly winds in the winter extend as far north as Coquimbo; and in the summer the southerly winds reach south to Chiloe, or even the Gulf of Penas.

This general condition of atmospheric pressure and resulting wind has a marked effect on the weather. The westerly winds which prevail to the southward of the large anticyclonic system in the south Pacific traverse some thousands of miles of ocean water, and become charged with vapor, so that when they strike against the Cordilleras they produce abundance of rain, accompanied by squally, thick weather, which is the general characteristic of the western coast of South America from the parallel of about 40° south latitude to the Horn. Northward of the fortieth parallel, or rather northward of the line of demarcation between the southerly and northwesterly winds, previously referred to, the climate becomes gradually less and less rainy; as the wind, having discharged its vapor on first meeting the mountainous coast range, and traveling northward to a warmer climate, has little more water to discharge, and finally a district is attained which is practically rainless.

Although this is the general condition of the wind and weather on the western coast of South America, it is subject to variation, more especially in the region between Chiloe and Cape Horn. The direction of the wind and the resulting weather in this locality appears to be caused by cyclonic disturbances from some western quarter, traveling to the eastward, south of Cape Horn. Unfortunately there are no regular meteorological stations hereabouts, excepting that at Punta Arenas in Magellan Strait, and consequently it is not yet possible to give any detailed account of the movement or frequency of these disturbances, or, in fact, of the local circum-

stances which cause variation in the weather on the western seaboard, but such peculiarities as have been observed are as follows:[1]

**Gales** of wind often succeed each other at short intervals and last several days. The weather may be fine and settled for perhaps a fortnight occasionally, but this is rare. Westerly winds prevail during the greater part of the year. Easterly winds occur chiefly in the winter months and are then strong; they seldom occur in summer.

Winds from the eastward invariably begin gently and are accompanied at first with fine weather; as they gradually increase, the weather changes, and a determined heavy gale is often the result. More frequently, however, they rise to a strong breeze, then die away gradually or shift to another quarter, showing that the disturbance causing them has passed to the northward.

Gales from the southward and squalls from the southwest are preceded and may be foretold by heavy banks of large white clouds rising in those quarters, having hard edges and appearing rounded and solid.

Gales from the southward are heaviest and most lasting, but they do not shift. Gales from the northwest last over a day, then shift with rain to the southwest without ceasing to blow, but with weather clearing and lower temperature, showing that the disturbance causing them has passed to the southward.

North and northwest winds are preceded and accompanied by low flying clouds, with a thickly overcast sky, in which the clouds appear to be at a great height. The sun shows dimly through them and has a reddish appearance. For some hours, or for a whole day, before a gale from the north or west the atmosphere is very hazy. Sometimes, but very rarely, with the wind light between north-northwest and north-northeast, a few days of beautiful weather may occur, but they are generally succeeded by gales from the southward, with much rain.

From the north the wind always begins to blow moderately, generally accompanied by small rain, but with thicker weather and more clouds than from the eastward. Increasing in strength, it draws gradually to the westward and blows hardest between north and northwest, with heavy clouds, thick weather, and much rain.

When the fury of the northwester (which varies from 12 to 50 hours) is expended, or even while it is blowing hard, the wind sometimes shifts suddenly into the southwest quarter, blowing harder than before. This wind soon drives away the clouds and in a few hours there is clear weather, with occasionally heavy squalls. In the south-

[1] By comparing the peculiarities described, with what might be expected to occur during the passage of cyclonic storms near this region, and bearing in mind Buys Ballots law respecting the motion of the wind around areas of low pressure in the Southern Hemisphere, viz, that they revolve in the direction of the hands of a watch, it will be seen that the gales are all produced by the passage of low pressure areas over or near the place of the observer.

west quarter the wind generally hangs several days, blowing strong, but moderating toward its end, and may be followed by two or three days of fine weather, showing that the center of the storm has passed south of the observer.

Northerly winds prevail generally during the summer months, but change continually from north to south, by the west, during that season, which would hardly deserve the name of summer were not the days so much longer and the weather somewhat warmer. Rain and wind prevail much more during the long than the short days.

It should be remembered that bad weather never comes on suddenly from the eastward, neither does a southwest or southerly gale shift suddenly to the northward. Southwest and southerly winds rise suddenly and violently and must be well considered in choosing anchorages and preparing for shifts of wind at sea. The most usual weather in these latitudes is a fresh wind between northwest and southwest, with a cloudy, overcast sky.

The equinoctial months are the worst in the year, generally speaking. Heavy gales prevail at those times, though not, perhaps, exactly at the equinoxes. March is usually the most boisterous month in the year.

August, September, and October are the coldest months. Westerly winds, rain, snow, hail, and cold weather then prevail. December, January, and February are the warmest months; the days are then long, and there is some fine weather; but westerly winds, which often increase to very strong gales, with much rain, are frequent even throughout that season, which carries with it less of summer than in almost any part of the globe.

In April, May, and June the finest weather is experienced, and, though the days are short, it is more like summer than at any other period. Bad weather occurs even during these months, but not so much as at other times. June and July are much alike, but easterly gales are more frequent during July.

It must, however, be understood that these attempts to analyze the weather are based on small premises and that generally bad weather may be expected all the year around.

**Lightning and thunder** are very rare, indeed scarcely known, except in very bad weather, when violent squalls come from the south and southwest, giving warning of their approach by masses of clouds. These storms are rendered more formidable by snow and hail of large size.

**Barometer.**—The variation of the barometer in these latitudes correspond with those of similar northern latitudes in a remarkable manner, changing south for north. It must be remembered, as previously stated, that the general state of the barometer off Cape Horn and over the Antarctic generally is low, viz, from 29.5 to 29.2.

The average range of the barometer in the higher latitudes between 50° and 60° is about 1.5 inches, but on extraordinary occasions ranges of 2.75 and 3 inches have been recorded.

**Rainfall.**—The following observations on the rainfall at Orange Bay, near Cape Horn, are summarized from the observations by the officers of the French Government expedition, 1882–3.

| 1882–3 | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rainfall in inches | 6.37 | 3.34 | 5.98 | 6.96 | 4.52 | 4.80 | 1.53 | 5.43 | ..... | 3.46 | 4.92 | 5.90 |
| Days in which rain fell | 28 | 24 | 24 | 26 | 25 | 21 | 21 | 23 | ..... | 26 | 28 | 28 |
| Hours of rain in month | 136 | 123 | 177 | 192 | 168 | 151 | 88 | 121 | ..... | 143 | 148 | 142 |
| Hours of rain per day | 4.9 | 5.1 | 7.4 | 7.4 | 6.7 | 7.2 | 4.2 | 5.3 | ..... | 5.5 | 5.3 | 5.1 |
| Days in which snow fell | 7 | 2 | 4 | 4 | 9 | 9 | 11 | 13 | ..... | 6 | 3 | 2 |

**Coast of Chile.**—The weather on the coast of Chile, between Magellan Strait and the Gulf of Penas, is cold, damp, and tempestuous. The prevailing wind is from northwest; but if it blows hard from that quarter, the wind is very liable to shift suddenly round to the westward and to blow still heavier, raising a mountainous and often a cross sea. These westerly gales, however, do not generally last long, but shift round to the southward, when the weather, if the barometer rises, will probably clear up. Should they, however, fly back to the northwest again, and the barometer remain low, or oscillate, the weather will doubtless be worse. Easterly winds are of rare occurrence, and, like winds from the southward, are accompanied with fine clear weather, whereas westerly winds bring with them a constant fall of rain and a quick succession of hard squalls and showers.

On the coasts of Chiloe, Llanquihue, and Valdivia, the prevailing winds are from the westward, northwesterly winds prevailing in winter and southwesterly in summer. Winds from the northward are damp winds and precursors of bad weather and rains; those from the southward and eastward bring fine weather. Winds from the eastward blow with but little force on the coast, but out at sea are occasionally very strong.

From the parallel of 35° south, or thereabouts, to near 25° south, the wind is southerly or southeasterly during nine months out of the twelve; in the other three there is really bad weather—northerly gales with rain occur not only on the coast, but far across the ocean in parallel latitudes; occasionally in this latter period there are calms or light variable winds.

From September to May is the fine season, during which the skies of Chile are generally clear, and, comparatively speaking, but little rain falls; there are, however, occasionally exceptions to this general

rule; strong northers have been known in summer, and two or three days of heavy rain, even with little intermission. These interruptions are more rare, and of less consequence, to the northward of latitude 31° than south of that parallel; and, indeed, so nearly uniform is the climate of Coquimbo that the city is called La Serena.

In settled weather a fresh southerly wind springs up a little before noon (an hour sooner or later) and blows until about sunset, occasionally until midnight; sometimes, in the height of summer, these winds are very strong.

This is also the case with a southerly wind in the open sea, between the parallel before mentioned; but there it is neither so strong by day nor does it die away at night. Within sight of land the winds freshen and decrease nearly as much as in the ports, where the nights are generally calm till a land breeze from the eastward springs up; but this does not last many hours. With these winds the sky is almost always clear; indeed, when the sky becomes cloudy, in summer, it is a sure sign of little or no sea breeze, and probably a fall of rain; in the winter it foretells an approaching northerly wind with rain.

In summer vessels anchor close to the land to avoid being driven out to sea by those strong southerly winds; but as the winter approaches a more roomy berth is advisable, though not too far out, because near the shore there is always an undertow, and the wind is less powerful. Northers give good warning; an overcast sky, little or no wind unless easterly, a swell from the northward, water higher than usual, distant land remarkably visible, being raised by refraction, and a falling barometer are their sure indications. All northers, however, are not gales; some years pass without one that can be so termed, though few years pass in succession without ships being driven on shore at Valparaiso. Thunder and lightning are rare. Wind of any considerable strength from the east is unknown. Westerly winds are only felt while a norther is shifting round, previous to the sky clearing and the wind moderating. The violence of southerly winds lasts but a few hours; and even a northerly gale seldom continues beyond a day and a night, generally not so long.

## PASSAGES.

**Cape Horn or Magellan Strait to England—Full steam power.**—Reverse of the outward route.

**Auxiliary steam.**—As in the sailing route, but using steam through the doldrums.

**Sailing.**—After rounding Cape Horn pass westward of the Falkland Islands if circumstances permit, on account of the greater freedom from ice, and then northeastward, crossing latitude 40° south in about longitude 45° west, and from October to April, 30° South

in about 25° west. Thence stand northward into and through the southeast trade, cross the Equator in about 27° to 29° west, and proceed then as from Brazil.

From May to September a vessel need not enter the southeast trade so far to the eastward, but could pass between Cape Frio and Trinidad Island.

If unable to pass west of the Falkland Islands, pass as close to the eastward as the wind will allow, and thence as above.

If a foul wind be met while southward of 40° south, it would be better to stand to the northwestward than to the eastward, as ice is likely to be encountered not far eastward of the Falkland Islands.

If to call at Montevideo the track would be direct along the land.

**Magellan Strait or Falkland Islands to Cape of Good Hope—All vessels.**—Stand to the northeastward and cross latitude 36° south in about longitude 40° west; thence proceed as directed for the different classes of vesels from Montevideo to the Cape of Good Hope.

Distance from Cape Virgins, for full-power steam route, 4,400 miles; from Stanley, Falkland Islands, 3,160 miles.

Vessels from the Falkland Islands should not go to the eastward of the direct route to 36° south in 40° west to avoid ice.

**Cape of Good Hope to Falkland Islands or Magellan Strait—Full steam power.**—Follow the rhumb line to Montevideo as far as 40° west; thence direct. The distance from the cape to Stanley by this route is 4,160 miles, and to Cape Virgins, 4,500 miles.

An alternative route (similar to that to Montevideo) is to steer straight for Rio de Janeiro as far as 20° west, and thence to Cape Virgins or the Falkland Islands; it would save much wear and tear, and the extra distance would probably be more than made up by lighter winds and favorable currents. The distance by this route to Stanley would be 4,273 miles; to Cape Virgins, 4,672 miles. Another advantage would be that in case of fuel running short a supply could be obtained by proceeding to Rio de Janeiro.

**Auxiliary steam or sailing.**—Keep well within the southeast trade until nearing Trinidad Island, whence follow the route from England to Magellan Strait.

**Montevideo to the Falkland Islands—Full steam power.**—Direct. Distance, 1,000 miles.

**Auxiliary steam and sailing.**—Keep well to the westward of the direct route until nearing the islands.

The return route is direct for all vessels.

**Montevideo to Cape of Good Hope—Full steam power.**—Do not go to the southward of 36° south till in 25° west, whence follow the great circle track, passing just southward of Tristan da Cunha

Island; distance, 3,640 miles. By this route ice will usually be avoided.

**Auxiliary steam or sailing.**—As in the full-power route till past Tristan da Cunha Island, whence the parallel of about 37° south should be kept until the Cape of Good Hope bears about northeast, thence direct.

Directions for making passage around Cape Horn and through Magellan Strait will be found in Chapters VI and VII.

# CHAPTER II.

## CAPE SAN ANTONIO TO RIO NEGRO.

**Cape San Antonio.**—Rasa Point, the northern extremity of the ill-defined Cape of San Antonio, is a low, sandy spit; breakers extend nearly 1½ miles northward of it toward Cabo Bank. Near the point is a series of sandy downs trending to the southward, increasing in height to Medano Point where they are from 65 to 80 feet above high water. The coast is of light color, with occasional tufts of stunted brushwood, and in clear weather this part of it may be seen from a distance of 8 or 10 miles.

**Light.**—From a lead-colored steel tripod tower 197 feet in height on Rasa Point is exhibited, at an elevation of 190 feet above high water, a revolving white light, visible 20 miles. A Lloyds signal station is established at the lighthouse.

**Coast.**—From Cape San Antonio to Medano Point, 35 miles to the southward, the coast is of a light color, low and sandy, with occasionally straggling bushes or patches of rough grass. Sand hills, between 20 and 40 feet above high water, begin to show themselves at 10 miles southward of Rasa Point, gradually increasing in number and height with the approach to Medano Point, near which they rise to about 100 feet. Two of these sand hills near each other, in latitude 36° 27′ south, resemble a Spanish saddle and are rather higher than the others.

Between 5 and 10 miles offshore east-southeast from Rasa Point, it was found in the course of the survey, that there was a change in the nature of the bottom in two different years although the depth remained the same.

This change is attributed to the soft, oozy mud from the Tuyu Bank being at times carried around Rasa Point and deposited upon the sandy bottom usually found to the southeastward of that point, until a strong current or gale from seaward washes it again into San Boronbon Bay.

**Medano Point.**—The land is higher about Medano Point than on either side. A range of hills between 100 and 200 feet above high water stretches to the west-northwest.

**Light.**—From a steel tripod, 203 feet high, painted red and white in horizontal bands, on Medano Point, is exhibited, 194 feet above high water, a fixed white light, visible 20 miles. The lighthouse is in latitude 36° 53′ 15″ south, longitude 56° 41′ west, approximate. The light illuminates an arc of 225° seaward.

**Medano Bank,** an extensive and dangerous shoal, stretches nearly 8 miles seaward from Medano Point within the 5-fathom line. Generally the water over it is much discolored, and the lead gives warning, but even in fine weather it is prudent to give this shoal a wide berth. In crossing it shallow and irregular soundings were obtained, and at 3 or 4 miles from the shore there are patches of not more than 2 fathoms.

**Shoals.**—A shoal, or obstruction, with a depth of 3½ fathoms over it, was reported in 1907 by the steamship *Antisana* to be situated at a distance of 27 miles 190° from Medano Point Lighthouse. Its position is doubtful.

A shoal, with estimated depth of 3½ fathoms, was reported in 1912 to lie 20 miles southward of Medano Point Light. This shoal and the one mentioned above are presumed to be identical.

A shoal, with a depth of 3¾ fathoms over it, was reported in 1910 by the steamship *Mont Cervin* in latitude 36° 56′ south, longitude 56° 22′ 45″ west.

These shoals are charted as P. D.

**Coast.**—From Medano Point to the narrow isthmus between the sea and Mar Chiquita Lagoon the coast is lower than near Medano Point, but with a similar appearance; sand hills 50 to 120 feet above high water, with a few patches of verdure. These sand hills and the coast near them have a whiter look than northward of the point.

At 13 miles southwest of the lighthouse is a conspicuous sandy cone, and at 25 miles a pyramidal hill, 150 feet above high water.

As in some places, especially toward Medano Point, the soundings are irregular, shoaling suddenly a fathom or two at a time, and then deepening again; it is as well not to approach it within a distance of 15 miles.

**Mar Chiquita,** 50 miles south-southwest from Medano Point, is a lagoon of salt water, visible from the masthead of a passing vessel, into which flow the Tandil and other small rivers. At the south end it is connected with the sea; the depth at mean low water in this outlet is 1 to 3 feet close to the sea, and 5½ feet farther up. In the last third of the ebb the water is sweet.

Southward of the outlet of Mar Chiquita the land rises and is no longer sandy. A low range of cliffs, 20 to 30 feet high, is surmounted by a rising ground, of which the highest is about 80 feet above high water. Pasture land will now be seen, and generally large numbers

of fine cattle on the high ground, near which is the Estancia de la Loberia Chica (Small Seal farm).

**Cape Corrientes,** 18 miles southward of Mar Chiquita, is a rather bold headland about 150 feet high, the southeastern extremity of a range of hills trending east and west. The Sierra Tandil and Sierra Vulcan form part of this range. In clear weather three ranges of the latter are visible, having a wedge-like form somewhat resembling the Bill of Portland. Near the sea these hills slope away gradually and are ended by a broken rocky shore.

A good landmark for recognizing the cape is a conspicuous hotel on its northeast side, far visible, often called by sailors the Bristol Hotel; the hotel of this name really stands farther northward in Mar del Plata.

**Mar del Plata Road** is situated ½ mile northward of Cape Corrientes; here is the town of Mar del Plata, and a cathedral with an unfinished tower. Wool is shipped from this place, brought out through the surf in flat-bottomed boats, and thence transshipped to cutters and taken to the vessels in the road.

The improvements contemplated at the port consist of two breakwaters forming an outer harbor. North pier to be ¾ mile long and south pier 1½ miles. Proposed depth at wharves will be 30 feet at low water to be increased to 40 feet when piers are completed. Refrigeration, fishing, and coastal accommodation will be provided.

**Communications.**—There is railway and telegraphic communication with Buenos Aires.

**Supplies.**—Provisions, with the exception of meat, are expensive.

**Landing.**—Landing in ships' boats is difficult and dangerous; a boat should therefore be signaled from shore at high water, the ship's boat remaining outside the breakers.

**Anchorage.**—There is good holding ground in 6 fathoms, clay, with the cathedral bearing about 267° and Cape Corrientes 210°. The anchors should be lifted occasionally, as they are liable to get buried. A vessel may anchor in this bay during offshore winds in 5 to 10 fathoms water, clean sandy bottom; but with easterly winds of any strength a heavy swell sets in and renders the anchorage unsafe and uneasy; vessels should then put to sea.

**Mogotes Point,** 5 miles southward of Cape Corrientes, is 104 feet high, bare and sandy, and terminates toward the sea in a low projecting spit, to which a vessel should give a birth of 2 miles. When near the point several sand hills may be distinguished, some of which are peaked and higher than others, when the name Mogotes, signifying pointed cornstacks, which these sand hills rather resemble. Behind the sand hills the high downs already described extend to the westward.

**Light.**—From a steel, lead-colored lighthouse, 115 feet high, on Mogotes Point, is exhibited, 180 feet above high water, a revolving white light, visible 20 miles seaward through arc of 225°. The lighthouse is in latitude 38° 11′ 45″ south, longitude 57° 28′ 00″ west.

**Communication.**—Mogotes Lighthouse is in telegraphic communication with the town of Mar del Plata. There is a signal station here.

**Andres Head** is the southwest extremity of a range of bold cliffs, about 70 feet high, which extend half way between that head and Mogotes Point; at their termination the shore is low, sandy, and rocky. The bight between Mogotes Point and Andres Head is foul and dangerous; many sunken rocks lie near the shore, causing blind breakers at sudden intervals. A short distance from Andres Head is the Estancia de la Sociedad (Society Farm).

**Tides.**—High water, full and change, off Andres Head is at 10h.; springs rise 8 feet.

**Tidal streams—Currents.**—The flood sets northward and the ebb southward. The currents between Andres Head and Cape San Antonio set strongly northward previous to and during southerly winds; and as strongly in the opposite direction under contrary circumstances. From 1 to 3 knots an hour are usually the limits of strength, although there are intervals when no current is perceptible; and, times, though rare, when the strength may exceed that above mentioned.

**Shoal.**—The master of the steamship *Birchtor* in 1904 reported that his vessel when of 24 feet draft, struck on a shoal situated 5 to 6 miles 153° from Mogotes Point.

This shoal has been charted as a rock with less than 6 feet over it, but the position and depth on it must be considered approximate. The least depth around the vessel when aground was 24 feet.

There is the hull of a wreck on this shoal, which at a distance has the appearance of a vessel underway.

**Bank.**—The master of the steamship *Juanita North* reported in 1904 that he obtained a sounding of 10 fathoms on a bank situated about 100 miles southward of Mogotes Point, in approximately latitude 39° 43′ south, longitude 58° 14′ west. It was again reported in 1910 by the Royal Mail steamship *Oriana*, of the Pacific Steam Navigation Co.

This bank, which is composed of fine sand, appears to be of some extent, as depths of 15 and 20 fathoms were obtained at distances of 5 and 8 miles, westward and southwestward, respectively, from the cast of 10 fathoms. The position of this bank, being dependent on dead reckoning, is approximate.

**Coast.**—From Andres Head to Hermeneg Point, 12 miles to the southwest, the coast is rugged and 20 to 30 feet above high water. There are a few detached irregular cliffs, and some gaps or creeks which might afford a landing place for a boat in fine weather, but there is neither shelter nor anchorage for a vessel. Close to Hermeneg Point is a bight, into which runs a small stream of fresh water.

Very few bushes appear on this part of the shore, and scarcely a tree, excepting a few near the Estancia de la Sociedad. Sometimes a considerable extent of grass land is seen, but in most places near the sea the ground appears sandy and barren, thinly covered here and there with coarse grass or by low prickly shrubs.

From Hermeneg Point to Black Point and thence onward to Asuncion Point and Mount Hermoso, a distance of about 180 miles from Hermeneg Point, the coast has a similar appearance and is equally unfit to approach. Occasionally the sand hills rise to 100 to 130 feet, some are more than usually barren, or there are a few more bushes and rather more grass to vary the view, but there is no other variety in this tiresome coast.

**Beacons—Mogotes Cove.**—An iron beacon, named "F," painted black, terminating in two triangular pyramids elevated 116 feet above the sea, has been erected in Mogotes Cove.

**Andres Head.**—An iron beacon painted red with staff and ball top mark elevated 107 feet above the sea and named San Andres is erected on the point at Andres Head.

**Miramar.**—At Miramar, about 5 miles westward of Andres Head Beacon, is an iron beacon, named Chica, painted black, with triangular top mark, 19 feet high and 46 feet above the sea.

**Point Hermengo (Hermeneg).**—An iron beacon, named Hermengo, with cylindrical top mark terminating in a truncated cone and elevated 63 feet above the sea, is located on Point Hermengo.

About 6 miles 245° from Hermengo Beacon there is a conspicuous hotel near the beach.

**Caution.**—The coast line in this locality, as determined by actual surveys, is 3.3 miles farther west than shown on the charts.

**Shoal.**—A shoal or obstruction with a depth of 3½ fathoms was in 1908 reported by the steamship *Harcroft* to exist about 20 miles southwestward of Hermengo Point, but its position is doubtful.

**Necochea.**—The River Gueguen, or Josef, or Quequen Grande, runs into the sea about 5 miles eastward of Black Point; its entrance, with 2¼ feet water on the bar, is accessible to boats during moderate weather when there is not much swell; but generally the sea rolls in heavily on this exposed shore. The village of Necochea, a seaside resort, is near the mouth of this river; it shows several hotels on the beach and at night is known by its numerous lights.

**Communication.**—There is a railway to Buenos Aires, Bahia Blanca, and Mar del Plata, and telegraphic communication.

**Tides.**—High water, full and change, in the Quequen Grande is at 6h. 18m.; springs rise 7 feet, neaps 4¼ feet.

**Caution** is necessary in weighing, should necessity compel a vessel to anchor off this coast. Although fine sand and broken shells are brought up by the lead, the ground, which is hard tosca, is full of holes, and unless great care is taken a vessel is liable to part the chain or break the anchor. The British man-of-war *Beagle* lost three anchors in one week while engaged in surveying the coast.

**Asuncion Point,** 95 miles westward of the River Gueguen, is the termination of a projecting sand hill 120 feet high; although the most marked feature of this unvaried coast, it is difficult to distinguish with certainty.

**Shoal.**—At 17 miles 238° of Asuncion Point and 6 miles from the shore there is a shoal with 15 feet water.

Another shoal with a depth of 4¾ fathoms over it lies 15 miles 223° from the 120-foot summit on Asuncion Point.

A shoal with 4 fathoms over it is reported to lie approximately 9 miles 188° from same summit.

In this vicinity the shore should be approached with caution, as there appear to be numerous patches of 5 fathoms or less.

**Sierra Ventana,** a mountain 3,500 feet high, an extraordinary height in this low country, derives its name from a hole in it, near the top, resembling a window. It is situated about 75 miles 305° from Asuncion Point, and is known by the Gauchos as Monte Hurtado, implying that it is out of place.

From the southeast the summit appears peaked, and from the south rather square, with a notch in the middle. A good bearing of this mountain and the latitude of the vessel will fix the position with certainty. In very clear weather the peaks may be visible 65 miles.

**El Rincon (the Corner)** is the deep bight of the coast at the head of which lies Bahia Blanca. Generally speaking, the water is shallow.

In El Rincon and along the coasts to the eastward and southward the lead will invariably bring up sand or sand mixed with broken shells, and perhaps some gravel; but the quality and color of the sand is very different in different places and should be carefully noticed, whether with a view to anchoring in good ground or to avoiding any of the numerous and very dangerous sand banks along the coast between Bahia Blanca and the Rio Negro.

On and near the banks the sand is always of a dark-brown color, very fine, and generally unmixed with other substances; sometimes pieces of shell come up on the lead; seldom anything else. If an anchor be let go upon this sort of ground, its recovery is doubtful.

There may be soft ground underneath, but rarely; most of the banks are formed of tosca (hard clay), and this very fine, dark-brown sand is simply the tosca pulverized.

In the offing, over soft ground, the sand is speckled or black or white, rather fine generally. When coarse it is mixed with gravel. Broken shells are frequent, though they do not occur so regularly as to assist in fixing a vessel's position.

Having such soundings as these last described, the seaman may be certain that his vessel is out of danger from a shoal, and that if necessary an anchor may be dropped with confidence. At night, if moderately fine weather and the wind offshore, it is better to anchor than to keep under sail. South or east winds send a swell into El Rincon, which obliges vessels to keep under sail; but north and west winds prevail during at least four days out of five.

**Directions.**—Sailing vessels bound for El Rincon, if the weather threaten or the wind be southerly or easterly, should stand offshore during the greater part of the night. Heaving-to or making free with the land is not to be recommended on any coast, much less on this, which is considered most intricate and dangerous by those who have frequented it during many years.

The land is extremely low and in most places almost flat; the banks are extensive and steep-to. A vessel may shoal her water from 10 to 2 fathoms in the distance of ¼ mile, even while the land is out of sight from the deck. To these inconveniences are also added strong tidal streams and gales from the southeast, which bring thick weather and a heavy sea that overfalls and breaks as it approaches the banks.

When steering toward El Rincon, if the object be to anchor in or near Bahia Blanca, the northern shore between Black Point and Asuncion Point should be kept in sight from aloft, or a position maintained between the parallels of 39° 5′ and 39° 15′. Eastward of Asuncion Point the land may be approached as near as may be thought proper.

Westward of Asuncion Point the soundings within 8 miles of the land are irregular and more caution must be used. Ridges of tosca extend southeastward from 5 to 10 miles from the shore. These ridges are so frequent and so regular that crossing them from northeast to southwest conveys the idea of a vast ground swell, the hollows occasionally 6 fathoms lower than the crests, and the distance from one hollow to another about 400 yards. The water shoals suddenly from 8 to 6, and at times from 10 to 4, fathoms, deepening again as quickly as it shoals.

The shoals southwestward of Asuncion Point and 6 miles from the land must be avoided. It is therefore necessary to keep well away from the land.

When 30 miles westward of Asuncion Point, and about on the parallel of 39° 10′, the Sierra Ventana may be seen if the weather be very clear, bearing about northwest by north, distant 65 miles. If not seen, the distance of the vessel from the north shore should first be ascertained, either by a latitude or by steering north, with attention to the lead and the lookout, until the waer shoals to 8 or 7 fathoms, if the land be not seen before obtaining that depth. Thence a course may be steered to make the lightvessel.

In approaching Bahia Blanca vessels should make the latitude of the lightvessel and then steer to the westward. The shore to the eastward should not be approached too closely, as it is low and sandy and not easily made out.

Strangers should never try to make the lightvessel with strong onshore gales, as they probably could not take on a pilot.

There is plenty of water in the channel, but the buoys and other navigational aids can not always be relied upon.

Vessels should not attempt to sail up to town, as the channel is narrow and the flood tide strong. Many accidents have happened and many anchors have been lost in making running moors. It is strongly advised that vessels anchor at Belgrano and telephone for a tug.

The accommodations are not adequate for the number of vessels that call here, but the port is rapidly improving. There are two more docks under construction and three or four powerful dredges working.

**Pilots.**—The pilots at Bahia Blanca, of which there are 13, are well organized and have a fine large cutter which constantly cruises outside the lightship.

**Tides.**—It is high water, full and change, at El Rincon at about six hours.

**Tidal streams.**—The tidal streams set strongly, the flood to the north, the ebb to the south, nearly six hours each day. Off Asuncion Point the flood sets to the eastward. They are much influenced by the winds, their strength varying from 1 to 4 knots when within 10 miles of the banks or land, and from half a knot to 2 knots when between 10 and 20 miles from the outer limit of the dangers.

**Current.**—The British man-of-war *Swallow*, 1900, when on passage between Montevideo and the Falkland Islands, experienced on six occasions, when in the vicinity of latitude 40° south, a northeast current accompanying by a fall in temperature of the sea water and foggy, misty weather. This belt of cold water crosses the meridian of 57° west in about latitude 40° south.

The British man-of-war *Nymphe*, 1901–1903, when making passages between Montevideo and the Falkland Islands, when near the parallel of 40° south and the meridian 57° west, encountered the

northern limit of a cold current setting to the northeastward. The southern limit of this current was not so well defined.

**Coast.**—A recent survey shows that the coast line extends in a 267° and a 76° direction from Recalada Lighthouse.

**Light—Recalada.**—From a steel pyramidal skeleton tower, 218 feet high, painted in red and white bands, situated on the northern shore of El Rincon, at about 19 miles eastward of Mount Hermosa, a flashing white light, visible 22 miles, is shown. The keeper's dwelling and other small structures stand near the lighthouse.

**Tides.**—It is high water, full and change, at the lighthouse at 3 hours 3 minutes. Springs rise 6¼ feet; neaps rise 5½ feet.

**Bahia Blanca,** at the head of the bight of El Rincon, extends as a narrow arm of the sea, filled with banks and islands, for 38 miles inland, terminating in a creek. The upper part is the harbor of Bahia Blanca. The outer part, with its many miles of anchorage ground, is the road of Belgrano (Puerto Belgrano).

**Lightvessel.**—A lightvessel moored in 5½ fathoms of water 12 miles 174° from Mount Hermosa, exhibits at a height of 44 feet above high water an occulting white light, visible 14 miles.

The vessel is painted in red and black horizontal bands and has two white masts with tower in center of vessel surmounted by lantern and day mark. "Bahia Blanca" is painted in white letters on each side. The tower, lantern, and day mark are painted red and black in horizontal bands. The light vessel is fitted with steam siren.

**Tides.**—It is high water, full and change, at the lightvessel at 3h. 45m.; springs rise 8½ feet; neaps rise 6¾ feet.

**Mount Hermosa,** situated close to the sea on the north side of the entrance to Port Belgrano, is a round hill 110 feet above high water, having a pyramid 59 feet high on its summit. Below the mount a low cliff about 12 feet above high water will be seen; it is the only one hereabouts and is named Parrot Cliff.

**Tides.**—It is high water, full and change, at Mount Hermosa at 4h. 1m.; springs rise 8 feet; neaps rise 6¾ feet.

**Hermosa Road,** with least depth of 3¼ fathoms, lies southward of the mount.

The northern shore from Mount Hermosa westward is low, being a succession of sand hills, partly covered with shrubs and rough grass. Six miles westward of Mount Hermosa is Tejada Point, with a pyramid 65 feet high; and about 6 miles farther to the westward is a black tripod beacon, visible from 10 to 12 miles, which, however, is said to be difficult to distinguish, owing to the windmills, etc., on either side of it. Anchorstock Hill, 15 miles westward of Mount Hermosa, is the highest (57 feet) and most peaked of the hummocks seen to the westward of the mount. Westward of Anchor-

stock Hill is Pareja Creek, and about 2 miles farther to the westward is the village of Punta Alta.

**Tides.**—It is high water, full and change, at Tejada Point at 4h. 10m.; springs rise 9 feet; neaps rise 7¾ feet.

**Measured mile.**—On the north shore of Port Belgrano, on either side of Anchorstock Hill, are two pairs of range beacons which mark by their alignments, 203°, the two extremities of a 1-mile base.

The rear beacons are iron, surmounted by triangular topmarks, points up, and painted black and white in horizontal bands. The front beacons are likewise of iron, surmounted by triangular topmarks, points down, and painted with the lower half white and the upper half black.

**The south shore** of Port Belgrano is formed by Trinidad, Bermejo, and Embudo Islands, low, flat, marshy islands, intersected by creeks, and not easily visible from a distance, though the tops of some of the bushes may be seen from the masthead.

**Dangers at entrance.**—North Bank extends 10 miles to the southeastward of Tejada Point with a least depth of 2 fathoms on the southeastern half and with shoal patches of half a fathom extending 4½ miles from the point.

Southwestward of the extremity of North Bank, 2¼ miles distant, lies New Bank, with a least depth of 2½ fathoms, and 3 miles westnorthwestward of New Bank is Middle Bank, with a least depth of ½ fathom. Long Bank extends in a southeast direction from Bermejo Island, its center lying about ½ mile southwest of Middle Bank. Northwestward of Middle Bank are East and West Banks. A shoal has recently formed between the two latter banks, extending from buoy No. 7 to buoy No. 8, necessitating a change in the channel which formerly led between them. Tht new channel, Manuelita Channel, now leads between East Bank and the western edge of North Bank.

Toro, Redondo, and Cuchillo Banks, all of which dry in places, lie on the port hand of the channel coming from seaward.

The banks are all hard; of fine dark-brown sand where they are steep and dangerous, of coarser and lighter-colored sand where flat, and safer to approach. The toro and the eastern extremity of the north bank are instances of the different qualities.

The fine dark-brown sand generally lies upon tosca. In the channels, between the banks, the bottom is everywhere dark, soft, sandy mud. On and near the banks it is everywhere hard. In the offing, when in the fairway, the ground will feel rather soft and sticky, still farther off it is somewhat hard, being clay, covered by speckled sand with broken shells.

The Great North Bank, projecting southeastward about 10 miles from the north shore, shoals very gradually; Toro Bank and Horn

Spit are the reverse, shoaling so suddenly from the deepest water that there is hardly time for the best leadsman to give warning.

Breakers are sometimes found on the edges of these banks, at other times only ripplings, and sometimes there is not a mark on the water by which they can be distinguished by a stranger. In fine weather the water is smoother on the banks than in the channels, where there is a slight tide ripple. This is also the case with a fresh breeze at high water; but at low water, especially with a breeze, breakers appear on the banks in all directions. With or after southeast winds, as long as the swell lasts, there are breakers on all the banks.

**Buoyage.**—The entrance channel from the lightvessel at Bahia Blanca is marked by light buoys conical in shape, surmounted by pyramidal-shaped towers with black cylindrical basketwork topmarks, over which are the lanterns. The topmarks are 12 and the lanterns 16½ feet above the water.

Light buoys Nos. 1 to 3, painted with black and white vertical stripes, each showing a fixed white light, are to be passed close-to. The channel between East and West Banks is marked on the port side by black buoys showing fixed white lights, and on the starboard side by red buoys showing fixed red lights. Above these the channel is marked by buoys Nos. 10, 11, and 12 painted in black and white vertical stripes and showing fixed white lights; and by buoys Nos. 13 and 15 painted red and showing fixed red lights and Nos. 14 and 16 showing fixed white lights.

The new channel between East Bank and the western edge of North Bank is marked by four buoys, as follows:

Entrance buoy red and marked "R. S." on bearings, Mount Hermosa Beacon 51°; tripod, 319° 30′.

Red buoy No. 1, Mount Hermosa Beacon 59°; tripod, 315°.

Black buoy No. 2, Mount Hermosa Beacon 67°; tripod, 312° 30′.

Buoy, block marked "R. N.," Mount Hermosa Beacon 76° 30′; tripod, 315°.

The 18-foot dredged channel from Belgrano Road to Port Militar tidal basins is marked by five conical buoys on each side, those on the starboard side being black and those on the port side red. In addition, outside the buoys on each side there are two pile beacons. The eastern ones have a triangular topmark and the western ones a square topmark.

There is a buoyed channel dredged to 23 feet leading to Port White southward of Bahia Blanca.

Red buoys with red lights should be left on the starboard hand when coming from seaward; black buoys with white light should be left on the port hand black and white vertical-striped buoys with white lights can be passed on either hand.

**Directions.**—The best time for entering Port Belgrano is near low water, as the channels between the mud banks can then be seen; guided by the buoys no great difficulty is experienced, but it should be observed that a heavy sea prevails with southeast winds. In thick weather it is prudent to anchor or stand off.

In clear weather, if the vessel's position has been correctly ascertained she may steer for the lightvessel; otherwise endeavor first to sight Mount Hermoso. This is not easy to make out, but will appear as the left extreme of the land when seen from the southeastward. No land will be visible to the westward, but from the masthead may be seen the tops of some bushes on the islands on the south shore of entrance.

From the lightvessel a course about 297° should be steered to pass Nos. 1 and 2 buoys on either side and when abreast the latter, the course should be altered to 322° to buoy No. 3 from which steer 336° to buoy "R. S.," when change course to 351° for red buoy No. 1 in Manuelita Channel. After passing this buoy change course to 331° for black buoy No. 2, whence the course is 305° for black buoy "R. N.," after passing which the course is 295° for buoy No. 10, black and white vertical stripes, and when abreast the latter change course to 293° for buoy No. 12, from which a 297° course leads up to the harbor.

**Anchorage.**—The most convenient anchorage for large ships is off Pareja Creek. The tidal stream attains a rate of from 1 to 4 knots an hour at this anchorage and it is recommended to moor with a good scope of cable, or if at single anchor to sight the anchor periodically.

**Port Militar.**—The new harbor works and dockyard are known as Port Militar, the village close to it is Punta Alta. At Port Militar the basins are completed but work is still going on with the dockyard.

The Naval Hospital is complete, and in full working order.

**Communications.**—A railroad connects Port Militar with Bahia Blanca, and also runs to the westward through a chain of forts on the north shore. There is a post and telegraph office.

**Coal and supplies.**—A large government supply of coal is kept in stock for the use of the Argentine Navy.

Fresh provisions can be obtained at Pareja Creek and Punta Alta; a stream water tank is kept in the basin for the use of vessels of war. Fresh water can be supplied to vessels in dock up to 100 tons per day.

**Tidal basins.**—The outer tidal basin is 1,640 feet in length and 1,312 feet in breadth. The inner basin is 1,312 feet in length and 885 feet in breadth, and is intended for repairing purposes, and small craft. The docks are entered from it.

**Dry docks.**—There are two dry docks, with dimensions as per table below:

| | No. 1. | No. 2. |
|---|---|---|
| Total length | 708 feet | 1,345 feet. |
| Width at entrance | 97 feet | 116 feet. |
| Depth of water on sill | 21 feet, 2 inches | 32 feet, 4 inches. |
| Depth of water on sill (highest tide) | 32 feet, 8 inches | |

The ground immediately behind the dock is being used for the construction of a naval arsenal.

**Mole.**—The mole at the railroad terminus is owned by the Rosario and Port Belgrano Co. and will accommodate four vessels.

**Repairs.**—Repairs of all kinds can be executed.

**Signal station.**—A large building, surmounted by a clock tower, is erected on a hill overlooking the dockyard. The lower part of the building is used as a fresh-water reservoir, the upper part as a signal station, with a complete signal system, including radio telegraph; call letters, D. B. B. This forms a conspicuous landmark and can be seen in clear weather from a distance of 15 miles.

**Tug.**—There is a powerful steam tug belonging to the port.

**Tides.**—It is high water, full and change, at Port Militar at 4h. 50m.; spring rise 10¾ feet, neaps 9 feet.

**Caution.**—The entrance to Port Belgrano should not be attempted unless the buoys are easily seen.

**Port White.**—This port is situated about 1 mile to the north-northwest of the entrance to Naposta Creek and with Port Galvan about 1 mile to the westward of it is the only port in the southern part of Buenos Aires Province. It is the terminus of the Great Southern Railroad and one of the most important centers in the Republic for the exportation of wheat. The channel has been dredged to 23 feet from abreast Port Militar to Port White, buoyed where necessary with black buoys on the port and red buoys on the starboard hand.

**The population** of Bahia Blanca, Ports Galvan, White, and Belgrano was 72,706 in 1914, of which one-half are Argentines and the others principally composed of Italian, German, Danish, French, and Swedish nationality. The small proportion of British are mostly connected with the railroad.

Port White is about 20 minutes by rail from the town of Bahia Blanca.

**Coal.**—There are two or three firms who can supply coal, an average supply of about 10,000 tons of Welsh coal being kept. Coaling alongside the Great Southern Railroad pier is done from railway trucks with large iron tip buckets and electric cranes.

**Pier.**—The steel pier belonging to the Southern Railroad Co. is T shaped and vessels berth on both sides of the head, which is about 2,100 feet in length, has 30 feet of water at the eastern end, and 26 feet elsewhere. It will berth about 16 vessels. It is furnished with electric cranes and all the latest facilities for berthing and is in direct communication with the railroad. There are also large sheds for storing grain and wool. The wooden wharf on the west side of the steel pier is used exclusively for loading grain for two steamers at a time. Inside of this wharf there is dock accommodation for loading and discharging lighters.

**Mole.**—On the east side of the original steel mole, running nearly north and south, there are two electric elevators. Each elevator accommodates 4 steamers, 2 on each side, which can be loaded at any stage of the tide by shoots. The depth alongside is 26 feet.

The Buenos Aires & Pacific Railroad Co. have constructed docks in concrete, and have at present two electric grain elevators and flour mill erected on the mole with accommodation for 11 ocean-going steamers, and when all the extensions are completed there will be accommodations for about 20.

**Tides.**—It is high water, full and change at 5h. 27m.; springs rise 12 feet, neaps 10¼ feet.

**Port Galvan** is about 1 mile westward of Port White. This port of the Buenos Aires & Pacific Railroad contains nine berths for ocean-going steamers and three for coasting craft. The large berths are dredged to a depth of from 26 feet to 30 feet at low water, and the small berths to 18 feet. One berth is served by a grain elevator, which, under favorable conditions, can load a 4,000 to 5,000 ton vessel in one day.

The total length of wharfage at present in use is 1,500 yards, or nearly 1 mile. The total tonnage handled in 1908 was 533,000 tons, but the capacity of the port is considerably greater than that represented by these figures.

The least depth to Port Galvan is the same as Port White. The cranes, loading appliances, captans, etc., are worked by electricity. Water for drinking and boiler purposes is supplied from hydrants on the pier.

**Beacons and buoys.**—A pyramidal beacon, surmounted by a topmark in the form of a ball, painted in red and white horizontal stripes, is erected on Pipa Point.

A beacon, surmounted by a topmark in the form of a disk, is erected on the shoal north-northwest of Point Pipa, distant 2¼ miles from the latter, and marks the west side of the channel to Port White.

Another beacon is erected on the shoal on the eastern side of the channel, distant ⅜ mile 14° from the western beacon.

Red buoys mark the starboard side of the channel, which is dredged to 23 feet to Port White, and black buoys mark the port side proceeding from seaward.

**Directions.**—After passing lightbuoys Nos. 15 and 16 keep Pipa Point Beacon a little on the port bow, passing the beacon about 800 yards distant, when steer to pass about 700 yards to the eastward of the beacon surmounted by a disc, on the western side of the dredged channel, from which the channel is well buoyed.

**Anchorage.**—Good anchorage can be found, with smooth water, but owing to the narrowness of the channel it is necessary to moor.

**Communications.**—The following lines engaged in coastwise trade stop at this port: Sud Atlantica, Marina Mercante Argentina, Compañia Importadora y Exportadora de la Patagonia, Nicolas Michanovich, and the Compañia de Navegaciones al Sud. The lines to Europe are: The Cosmos Line, North German Lloyd, Chargeurs Reunis, and the Pacific Steam Navigation Co.

**Supplies.**—Provisions of all kinds and the best quality may be obtained in any quantity and at reasonable prices; fish may be caught by the seine. Deer, ostriches, tinamu, and crested partridges, locally named copeton, are to be found in the neighborhood. Fresh water is laid on the railroad pier.

**Trade.**—The trade of Bahia Blanca is steadily increasing. The principal exports are wool, sheepskins, hair, dry hides, and wheat. There are few direct imports.

**Tidal stream.**—In the entrance the tidal stream runs between and parallel to the banks, nearly northwest and southeast, from 1 to 3 knots per hour.

**Winds—Fogs.**—The prevailing wind is northwest, which blows very strong, but this wind is local, generally calms down at sunset. and seldom extends far to seaward. When the northwest wind has blown for some days it shifts to southwest and southeast, which winds sometimes blow with great strength. Thick fogs and heavy dew are experienced with north and northeast winds.

**Falsa (False) Bay,** the next inlet southward of Port Belgrano, is an extensive and dreary waste. Sand banks surround it, and neither land nor landmarks can be seen until a vessel is within its banks. In the hands of an enterprising and seafaring people the conditions would be widely different, but now, without even a point of land in sight, only the lead, the chart, and the latitude assist the seaman.

The remarks on the nature of the banks and the precautions necessary, just given in the description of Port Belgrano, apply equally to Falsa Bay, Green Bay, and Brightman Inlet. As little is known of these places, they should not be attempted without local knowledge.

Off Lobos Point, the southeast point of Trinidad Island, is Lobos Bank, which extends to the south-southeastward to a distance of 7½ miles from the point, and a large part of which uncovers at half ebb; it does not shoal so quickly as the other banks. The banks should be carefully avoided.

**Beacons.**—An iron beacon in the form of a triangular pyramid, 43 feet high, surmounted by a ball 13 feet in diameter, the ball carrying above it a pole with a smaller ball at half mast, the whole painted black, is erected on the southeastern part of Trinidad Island, south side of Bahia Blanca Entrance, with Mount Hermosa bearing 39°.

A beacon consisting of a platform supported on an iron truss 29 feet above a pentagonal concrete foundation is erected on the northern side of West Gate Post Bank, with Mount Hermosa bearing 75°.

A beacon 72 feet high is erected on a dune 40 feet high, located on the northwestern point of Ariadne Island.

A conspicuous tree near the center of Trinidad Island forms an excellent landmark. It bears 307° 30′ from the beacon on same island.

**Labyrinth Shoals,** in the entrance of Falsa Bay, nearly all under water, extend southeast from Ariadne Island to the parallel of 39° 24′. Here and there a patch of sand uncovers temporarily and affords a resting place for seals. When near these shoals some rising ground will be seen on Green Peninsula which, though only 60 feet above high water, appears higher on account of being surrounded by a dead flat.

**Paz Bank,** the southern extreme of Labyrinth Shoals, is the most outlying, and is very dangerous. There is about 4 feet water on it, and its seaward side shoals gradually. As the land is in sight from the vicinity of this bank, it may be avoided during daylight without difficulty. The heights on Green Peninsula bear from it about 303°, distant 8 miles. The nearest point of the island is distant 5 miles.

**Channels.**—There are two channels to Falsa Bay, the southern one, Patagonia Channel, about 1 mile wide, with a least known depth of 5¾ fathoms between Paz Banks and the coast reefs off Green Peninsula; and the other, East Channel, between Paz and Lobos Banks, has a least width of 1,600 yards and a depth of 3½ fathoms. Two conical buoys, one 7 miles and the other 10 miles, bearing 131° from the beacon on the northwest point of Ariadne Island, mark the channel and should be left on the port hand on entering from seaward.

**Directions.**—To enter, vessels should bring the beacon on Aridane Island to bear 311°, and steer for it, passing close to the outer buoy. When within 1 mile of the inner buoy steer 343° for the anchorage in the bay between Ariadne and Trinidad Islands.

Green Bay, formed to the northwest of Paz Banks, is beset with shoals in its western part, though the entrance appears somewhat tempting.

Brightman Inlet is formed between Green Peninsula and Laberinto Point. The entrance is on the northern side, but should not be used without local knowledge.

On the south side of the entrance the land is level and rather low, terminating in Laberinto Point, 25 feet above high water. On Green Peninsula are some peaked hillocks. At low water there was at the time of the survey a depth of 1¾ fathoms on the bar, which is about 200 yards wide.

Green Peninsula has an excellent soil, and with good anchorage and deep water not far from shore, is capable of much improvement.

**Beacons.**—An iron framework pyramidal beacon, 67 feet high, is erected on Laberinto Point, the southern entrance point of Brightman Inlet.

There are 3 beacons on Green Peninsula, one pyramidal in shape and 45 feet high, on the easternmost hummock of the peninsula 3.7 miles 32° from the beacon on Laberinto Point, and 2 on the north shore. One of the latter is located on the beach, and the other, 32 feet high, on the southernmost of a series of 4 hummocks, located about 5½ miles northward of the Laberinto Point Beacon.

**Buoys.**—A sea buoy is moored in 5 fathoms of water 3.8 miles 90° from the beacon on Laberinto Point and four red buoys mark the port side of the channel to Brightman Inlet.

**Directions.**—To enter Brightman Inlet vessels should pick up the sea buoy and steer 270° for Laberinto Point Beacon. The bar will be reached when the eastern end of Green Peninsula bears 0°. Leave the first buoy to port and when past it haul up to 295° for the second buoy. When the pyramid on the eastern end of Green Peninsula bears 14° haul up to 313° and anchor when the same beacon bears 20°.

**Caution.**—Little reliance can be placed in the charts or directions owing to the constant alterations taking place in the banks and bars; also the buoys are liable to shift.

**Supplies.**—There is abundance of game on the mainland and on Green Peninsula. Good water may be obtained by digging wells about 8 feet deep on the island. Plenty of fuel may be cut on the mainland.

**Tides.**—High water, full and change, in Brightman Inlet is at about 3h. 44m.; springs rise 7½ feet, neaps 6½ feet. There is only half an hour between high water in the inlet and in the offing.

**Tidal streams.**—The tidal streams run 1 knot to 2 knots an hour; the flood sets across the entrance, and a vessel should therefore keep to the southward sufficiently to insure a proper position.

**Coast.**—From Laberinto Point the coast trends south to the mouth of the Colorado River, 25 miles, and as far as known is quite free from dangers. The water shoals regularly and a vessel may close

the lowland as convenient by the lead. A range of sand hills, 30 to 40 feet high, extends parallel with the shore. The beach is sandy and in some parts dries more than a mile out at low water.

At the entrance of the Colorado River the sand hills end abruptly, forming a low but distinct headland. Flat-top hill, a sand hill 40 feet high and covered with verdure, rises at ¾ mile north of the river; it is the highest on this part of the coast and easily recognized by a stranger.

**The Colorado River** rises at the foot of the eastern slope of the Andes, and after a general southeasterly course of about 550 miles falls into the sea 7 miles north of Union Bay. The river is accessible to coasters of 7 feet draft. The bar, about 1 mile off the entrance, and the banks inside the river are continually changing.

The entrance to the river, not more than 100 yards wide and only 3 feet deep at low water, may be known by the abrupt ending of the sand hills; south of the river the land is flat and low. When east of the mouth, trees (a kind of willow and the only trees on the coast) will be seen growing on the banks a short distance inshore.

It is difficult to enter in a sailing vessel, even with the flood stream, unless the wind is fair and not too strong; the current of the river makes the flood stream weak, but the ebb runs very strongly. A strong southeast or easterly wind throws so much sea upon the bar that to attempt to cross is then useless.

**Caution.**—No vessel, however small, should attempt to enter with a swell on the bar, and it is also prudent to wait outside during one low water in order to see where is the best channel.

**Tides.**—High water, full and change, in Colorado River is at 4h. 0m.; springs rise 9 feet, neaps 7½ feet.

**Union Bay,** 7 miles southward of the Colorado River, is adapted to the use of vessels drawing less than 17 feet. In smooth water, with a fair wind, a deeper draft sailing vessel might enter, as there is not less than 5 fathoms in the fairway at high water.

Indian Head, the north point of the bay, appears as an island when seen from the northward, the land westward of it being very low. It is 25 feet high, bluff to the southeast, and is composed of sand hillocks partly covered with bushes; it can not be mistaken, as it rises from very low land, in many places almost level with the water at ordinary spring tides and nowhere exceeding 20 feet in height.

Creek Hills are three hillocks about 70 feet high, 2 miles northwest of Indian Head. A little to the westward of Indian Head is a creek which passes close to Creek Hills, and through which boats may work their way to the Colorado River at half tide.

Union Bay will be of great advantage when the banks of the Colorado River are inhabited and cultivated; all intercourse with this

river and by the river with the interior, must be carried on through this good port, entirely sheltered, with practicable landing places, and very accessible if lighted and buoyed.

**Water.**—Good water may be obtained by digging a few feet into the sand, but firewood about Indian Head is scarce.

**Banks.**—The chief dangers to be guarded against in approaching and entering the bay are Serpent Bank, Dog Bank, and the tidal streams which set across them. Serpent Bank extends eastward from Indian Head in a long ridge for 4 or 5 miles; as far out as 2 miles from the land it dries at low water; it shoals gradually on the north, but rather suddenly on the south or channel side. Dog Bank extends eastward from the south point of the bay in a similar manner, but is of greater extent; the water shoals upon its edge rather quickly.

The nature of the bottom changes as the vessel approaches these banks, as it does in the other inlets and harbors of this coast; in the middle of the channels it is soft, dark-colored, sandy mud; near and upon the banks, hard fine brown sand.

**Directions.**—Vessels intending to enter Union Bay should make the land about the Colorado River where the coast is clear and the lead to be trusted. Flat-top hill, 40 feet high, just north of the Colorado River, should be seen, and when 5 miles distant, 292°, the depths should be 5 to 7 fathoms, sand.

From this position steer 174°, or rather make good this course until the water shoals on the north side of Serpent Bank, or until Creek Hill bears west. Starve Island and perhaps a part of the southwest side of Union Bay may be seen at the same time with Indian Head, or soon after.

On Starve Island a peaked hillock (the middle one of three) may be of use when crossing the tail of Serpent Bank. It must be kept to the westward of 247° while crossing, in order to insure having sufficient water.

When Creek Hill bears west, and Indian Head 253°, steer 146° for 5 miles (by ground log), then 213°, until Indian Head bears 298°, when steer for it on that bearing (allowing for tidal stream) until the vessel is between the Serpent and the Dog Bank and 2 to 3 miles from the head; then steer 275° and anchor with Indian Head 349°, distant ½ mile, in 4 fathoms at low water, soft muddy bottom.

This anchorage is preferable because of ready communication with the shore; in all other parts mud flats extend off so far that at low water boats can not land.

**Tides.**—High water, full and change, in Union Bay is at 3h. 10m.: springs rise 12 feet, neaps 9 feet.

**Tidal streams.**—The flood stream at the entrance sets northward across the banks at the rate of about 2 knots an hour. The ebb, with

rate of 2½ to 3 knots an hour, at first sets right out and then, as it clears Dog Bank, more to the southward. Here, as farther north, the tidal streams are much influenced by the winds. Northerly winds weaken the flood, or arrest it altogether if sufficiently strong; southerly winds have the contrary effect.

**Water.**—Good water may be obtained by digging a few feet into the sand, but firewood is scarce about Indian Head.

**Anegada Bay.**—That portion of coast southward of Union Bay, between Indian and Rubia heads, a distance of 38 miles, is appropriately named Anegada (overflowed) Bay. Through it there are numerous creek communications by which a boat may reach Union Bay and thence the Colorado River.

**Sand banks.**—Extensive sand banks stretch 10 to 15 miles seaward off the whole of this coast, some appearing soon after first quarter ebb. At high water very little dry land can be distinguished from the outer edge of these shoals, even from the masthead. Every vessel should, therefore, give these shoals a wide berth, and especially when bound northward, as the flood stream sets northwestward toward the banks 1 knot to 3 knots an hour. These shoals are in ridges parallel with the coast, with depths of 2 to 6 fathoms on them, and 8 to 12 fathoms between them.

There are always breakers near the edges of the bank, but on the dangerous ridges, where the depths are only 2 or 3 fathoms, there are no breakers in fine weather. A slight rippling or an unusual smoothness and some difference in the color of the water are, with the soundings, the only warnings of these dangers. When there is much swell the whole extent of the banks is shown, even where there are 4 or 5 fathoms water.

Viper Bank and the Tail of the Snake, with their accompaniment of parallel ridges, are extremely dangerous. In going southward there is less danger, if the lead be carefully attended, because the water shoals first on the outside bank and a vessel may at once haul off to seaward.

Strong southerly winds cause the flood stream to run a half hour to an hour longer, and with more strength. Strong northerly winds have a diminishing effect on the flood, but make the ebb run stronger, and cause the water to fall unusually.

While passing these banks Creek and Deer Islands may be seen from the masthead if the weather be clear, but it is better to keep so far off as not to see the land at all.

**Northeast Sands** extend 10 miles eastward from the shore of Deer Island, and at one point the depth is only 3 fathoms at 13 miles 107° from the north end of the island. The Northeast Sands form the northern side of the channel to San Blas Harbor.

**San Blas Harbor,** extensive and well sheltered, is formed southward of the low islands and extensive sandbanks of Anegada Bay; the entrance is considerably obstructed with banks, which cause strong tidal streams in the narrow channels between Northeast Sands and Rubia Head, the south point of the entrance.

**San Blas Banks,** named Hellgat, Middle, Azopardo, East, and Northeast, extend for 6 miles southward of the entrance to San Blas Harbor, with navigable channels, known as Constitucion and East. Constitucion Channel, formerly the principal one, is now reported to be closed; East Channel is now buoyed and chiefly used.

**Beacons and buoys.**—A square tower, 22 feet high, black and white in horizontal bands, stands on the sand hill northward of Rubia Point, about 6.2 miles southward of Rubia Head. Its summit is 61 feet above high water and should be visible 12 miles.

Tres Medanos, a pyramidal structure 66 feet high is erected near the shore at the entrance to Guanaco Creek.

La Ballena, a beacon 39 feet high, is erected on the shore on the southern side of the entrance, and from Tres Medanos Beacon bears 6° distant 2.7 miles.

Caldera Beacon, 55 feet high, is situated on the southern shore of the harbor, 306° distant 2.2 miles from La Ballena Beacon.

Dos Hermanos Beacon, on the western hummock of Dos Hermanos, about 1.5 miles 302° from Caldera Beacon, is a post surmounted by a crosspiece and ball. It is 55 feet high.

El Tosoro, in the southern part of Deer Island, has a pyramidal structure 80 feet high erected on it.

East Channel is buoyed as follows: The northern side is marked by 4 conical buoys, the outermost painted in black and white vertical stripes and marked "Recalada" in white letters. The next three buoys are situated on a 300° bearing from Recalada Buoy at 1.7, 3.5, and 4.8 miles, respectively, from it. Buoy No. 5, on the southern side of the channel, is moored 1.4 miles from buoy No. 4.

**East Channel** has a least depth of 15 feet at lowest low water in a direct line; Constitucion Channel is no longer used, and the buoys formerly marking it have been withdrawn.

Tres Medanos Beacon, bearing 280°, should lead to the outer buoy of East Channel, whence a 300° course will lead into the harbor.

**Directions.**—On account of the strong tidal streams that prevail off San Blas, and the dangerous set of the flood onto the banks at the entrance and to the northeastward, sailing vessels with flood tide should make the land about Raza Point, well to the southward; with the ebb or southerly stream the land might be made about Second Barranca or Rubia Point; the lighthouse on the former and the tower on the latter are good landmarks.

The best time for vessels to enter is at the last of the ebb, when the banks, though not dry, are rendered plainly visible by the sea breaking over them, and are then said to afford a sufficient guide even in the absence of the buoys. A vessel will thus also have the first of the flood to carry her to the anchorage.

**Anchorage.**—The best anchorage, secure from all winds and well sheltered from the southeast, is in 14 fathoms of water, stiff sandy mud covered with coarse gravel and shingle, off the watering place 4 miles within Rubia Head, at ½ mile from the beach; it is advisable to moor with open hawse to the south.

The beach is steep-to, with 6 fathoms of water at a few yards, and boats may land here in any weather.

**Tides.**—High water, full and change, at San Blas wharf is at 1h. 40m.; mean spring range 5¾ feet; mean neap range 4¼ feet; the tides are affected here, as elsewhere on the coast, by the wind.

**Tidal streams.**—The flood stream sets strongly toward East Bank, and the ebb toward and over Hellgat and the northern part of Middle Bank, and in the southern part of Constitucion Channel toward East Bank. The velocity is 2 to 4 knots an hour, the flood being somewhat stronger than the ebb. Southeast gales increase the velocity at times to 5 knots, and have been known to raise the tide by several feet.

The tidal streams along this coast run with dangerous strength, 2 to 4 knots an hour. As the flood, which is the stronger by nearly a knot, sets directly toward the outlying banks, a vessel near the entrance, with this stream running and not going to enter the harbor, must stand to the southward or anchor and wait for the ebb. With the flood stream, weighing would be out of the question.

With and after a gale from the southeastward, both channels and banks are covered with heavy rollers and breakers. At such a time it would be highly improper to attempt to enter. The last part of the flood stream comes from the northward, from Anegada Bay, at which time the tide is beginning to ebb at the Gats.

**Settlement.**—The settlement is about 3½ miles within Rubia Head, on the south shore; off it is secure anchorage.

**Communication.**—The Sud Atlantica Line (Argentine) steamers make fortnightly trips to Bahia Blanca and Buenos Aires. There is frequent communication with San Carmen (Patagones) on Rio Negro, about 40 miles to the southwestward, direct, by road; also telegraphic communication with Bahia Blanca.

**Supplies.**—Sheep may be obtained, but vegetables and other supplies can be procured only from Patagones; the game consists of deer, ostriches, cavies, and small and crested tinamu, which latter may be shot close to the beach, but are in large number about Rubia Point. Fish are abundant.

There is a plentiful supply of good water in the wells near the beach in San Blas Harbor. From one of these wells, formed by sinking two casks in the ground, one placed above the other, a vessel obtained 5 tons of water in one day.

Fuel is scarce in the immediate neighborhood, but can be procured in quantity and of good quality by sending to the inhabitants, who bring it from the interior in carts; it is named Peccolini, is the best fuel on this coast, and perhaps as good as any wood for burning; iron may be brought by it to a welding heat.

**Climate.**—There is no rainy season, but during winter there are occasional though not heavy rains. During most summer nights there is no dew.

**Coast.**—From Rubia Head to Rubia Point and thence southward to the Rio Negro the coast is a line of sand hills, few as high as Rubia Point, here and there partly covered by rough grass and by low prickly shrubs. From Rubia Point to the bar of Rio Negro the coast may be more closely approached, for there are neither shoals nor rocks when 1 mile from the beach, and the lead may be trusted; but the tidal streams set strongly, 2 to 4 knots an hour, following the coast, nearly 6 hours each way, so that, if not allowed for, a vessel supposed to be to the southward of Raza Point might run aground on the banks near San Blas. On nearing Rio Negro the sand hills are lower; some of a different character just show inland.

**Rubia Point,** about 7 miles southward of Rubia Head, is 40 feet above high water; and Second Barranca Point, 11 miles southward of the head, a similar hill, is covered with shrubs and grass, with a low cliff in front of it, remarkable as being the only one in the locality.

**Light.**—From a black hexagonal tower and keeper's dwelling, painted with red and white adjacent bands, 113 feet high, there is shown at a height of 154 feet above high water a group flashing white light, visible 18 miles. This light is situated on the beach about 1 mile southward of Second Barranca Point.

**Rasa Point,** 18 miles southward of Rubia Head, has on it a round sand hill about 30 feet above high water, and there are three or four flat-topped sand hills about 5 miles to the southwest. These hills or hummocks may not be sufficiently remarkable to determine the position of the point, and a stranger may find difficulty in recognizing them, particularly as their forms may sometimes be changed by gales of wind.

**Rio Negro,** separating the Province of La Plata from Patagonia, now in the Argentine Territory of the Rio Negro, falls into the sea between Redonda or Main Point on the east and Medano Point on the west. These points are fronted by extensive banks, between which is the bar and channel into the river. Northeast bank is hard

sand and shingle. Southwest bank is chiefly a quick sand, fine and dark colored. During one night a vessel of 60 tons burden was buried in it, although the water was smooth, with little swell.

South Barranca Hill, about 3 miles southward of Rio Negro, is a range of perpendicular cliffs, 200 feet above high water, rising suddenly from the lowland at the entrance to the river. This, with North Barranca Hill, 160 feet above high water, 6 miles eastward of the river, will assist in identifying the entrance.

Heavy gales assist the torrents from the interior in altering and shifting the banks at the entrance, yet the main channel over the bar is said to vary but little. But in places in the river where formerly there were 3 fathoms the depth has been reduced to about 3 feet.

**Light.**—From a 12-sided white tower on the east point of South Barranca Hill is exhibited, 142 feet above high water, a fixed white light, visible 14 miles, over an arc of 213°, between 226° and 79°.

**Buoys.**—Two buoys are moored on the bar. No. 1 buoy is painted black and is moored in 11 feet of water on the edge of Southwest Bank. No. 2 is painted red and is in 10 feet of water on the edge of Northeast Bank.

**Main Point** is a hummocky sand hill, 40 feet above high water, and appears from the eastward as three hummocks, tolerably covered with verdure.

**Beacon.**—A beacon, surmounted by a cask and signal mast, stands on Main Point.

**Flat Point,** on the eastern bank nearly a mile within Main Point, is sandy, 25 feet above high water, and covered with verdure. It shows a steep side to the southwest, is wedge shaped, and makes a leading mark into the river.

**Leading Hill,** about 6 miles northwestward of Main Point, is 130 feet high and the mark of most use in entering the river, as it may be seen 3 to 4 miles outside the bar. It is the higher and the more eastern of two headlands and has a small round-topped hillock at the southwest extremity, which slopes suddenly to the southwest.

**Medano Point,** the west point of entrance, is bare and sandy, and in very high tides is overflowed, when the entrance of the river appears to be three times its usual width. South Point is a cluster of sand hills ½ mile northwest of Medano Point. South Barranca Hill, 200 feet above high water, faced by a cliff and situated about 3 miles southwest of Medano Point, with its lighthouse assists in identifying the entrance. Both Main and Medano Points are steep-to when abreast of them, and by closing them the opposite banks, which are dangerous, are avoided. Abreast of Main Point the channel is only 300 yards wide.

**Carmen de Patagones,** with a population of 2,000, is situated on a steep sandstone bank, on the left or northern bank of Rio Negro,

about 14 miles above the mouth. Opposite to it, on the right bank, lies the village of Viedma with 4,000 inhabitants, which has post and telegraph connection.

Encouragement and protection would make this a thriving settlement. The climate is delightful and the soil on the banks extremely rich, being watered by the periodical overflow of the river.

**Supplies.**—Fresh provisions in moderate quantities, some firewood, plenty of vegetables, and, during the season, abundance of excellent fruit may be procured.

**Communications.**—Roads lead from Patagones to Bahia Blanca, Choele Choel, and Grande Parada, the last a station of the Colorado Railway. Steam vessels of the Hamburg-South American, Mihanovich, and Baccaro Lines call here. There is a telegraph office here.

Vessels of 10 feet draft can ascend the river to Carmen de Patagones and Viedma.

**Bar.**—The passage across the bar is not more than 200 yards wide, with only a few feet at low water, and the banks and depths on the bar are reported to have changed considerably, so that no stranger should attempt to enter without a pilot unless having previously examined the entrance.

The maximum draft taken into the river by the pilots in 1880 was 12 feet. Though vessels of slightly deeper draft could enter with smooth water, they were liable to be detained for some weeks in the river before they could get out. Such smooth water is rare on this exposed coast, and, generally speaking, 11 feet was the utmost draft that could enter the river without incurring risk.

The edge of the bar will always show either by breakers or by ripplings, and rarely does a day occur on which there are no breakers; with any swell the breakers extend all over the bar, not excepting the channel.

Directly after high water the ebb stream begins to set strongly out of the river and over Northeast Bank, and should a sailing vessel be met by it she must either anchor or stand out to sea if not well inside the bar and in plenty of water. Very few vessels have escaped after once grounding on the banks or bar of this river.

Leaving the river is rather more difficult than entering, because of meeting instead of leaving the southerly swell. Vessels have been detained 40 days at the entrance, waiting for an opportunity to cross the bar. No sailing vessel should make the trial without a commanding breeze; for light winds are treacherous, and on the river vary in direction. Northeast winds are the best either for entering or leaving.

**Bar signals.**—The signals, made from the flagstaff at Main Point, are of two kinds, compass or general, and consist of balls hoisted at the masthead and yardarms of the flagstaff, thus:

**Pilots.**—A pilot, maintained by the Argentine Government, lives at the entrance of the river, and, if the bar is practicable, comes off to vessels wishing to enter.

**Anchorage.**—Good anchorage, and a convenient place for waiting to cross the bar, is southwestward of the bar, in 8 fathoms of water, sand, with Main Point bearing 17° and the lighthouse 315°. While the winds have northing and westing this is a good roadstead; but it must be quitted directly the wind gets to the southward or eastward, if threatening to blow strong. Heavy seas are sent in by southerly gales, and the strength of the tidal streams should be remembered.

**Directions.**—In approaching the Rio Negro it is best to make the land to the southward about the False Sisters or Bermeja Head. Certainty of the latitude may justify a direct course for the river, making proper allowance for the tidal stream, but on no account should a vessel incur the risk of being set to the northward of Rasa Point.

The land about Bermeja Head is high, the water free from danger, and if set out of her reckoning during the night or thick weather a vessel will not run the risk of getting ashore. Northward of Rasa Point the case is reversed, as the stream of the flood sets strongly toward the San Blas Banks. Many vessels have been wrecked from this cause.

With Main Point bearing 350° or more northerly, approach the Rio Negro Bar until the water shoals to 10 fathoms, and if circumstances do not admit of attempting the passage at once, anchor or stand off again.

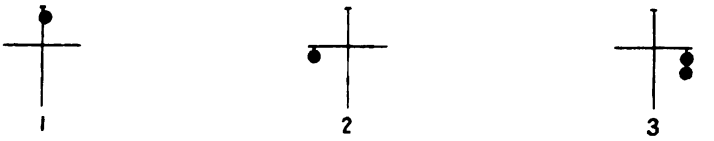
The proper time for crossing the bar is during the last quarter of the flood. The water does not rise during this period, and it is of material consequence that a vessel enter the river before the ebb stream makes out with strength. At this time the flood stream is setting strongly to the northeastward along shore over the bar, and the difficulty is to avoid being set to the northeastward in crossing it.

After high water this difficulty is increased, because the powerful ebb out of the river meets the flood flowing to the northeastward along shore and together they sweep over the eastern bank at rates of 3 to 5 knots an hour.

Leading hill on with the summit of Flat Point, or just open westward of Main Point Beacon, bearing 333°, leads over the bar in probably the best water. From its shoalest part Barranca Lighthouse bears about 275°. In 1880 the marks in use were the beacon on Main Point in line with another beacon, without ball, probably on Flat Point, which may differ slightly from the old marks just given. In

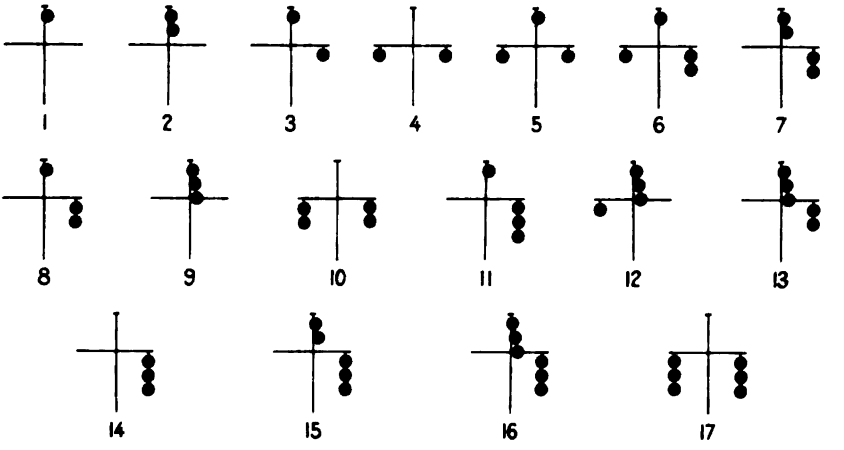
* This signal is the same as No. 1 of the general signals and is perhaps an error; the ball may properly belong at the north yardarm instead of the masthead. See diagram opposite.

## COMPASS OR STEERING SIGNALS.




1. Course, keep.
2. South.
3. North.

## SIGNALS OF GENERAL SIGNIFICATION.




1. You can not enter.
2. You can enter.
3. The vessel is seen.
4. The pilot is going out.
5. Follow signals shown from the flagstaff or the pilot boat.
6. Do not approach the bar, as the weather is threatening.
7. Cross the bar and steer for the pilot boat in accordance with signals.
8. Approach the bar, as the tide serves.
9. The pilot has no boat; send a boat in, well manned.
10. Cross the bar, on which there is a depth of 18 feet.
11. Vessels can not enter on this tide.
12. The pilot boat can not come out, as the bar is breaking; attend to the signals.
13. The depth on the bar is not more than 12 feet at high water.
14. Stand off until you have the landmarks in line; attend to the signals.
15. Remain off the bar until high water, so as to be able to enter then.
16. Approach the southern bay into a depth of 5 fathoms, to meet the pilot boat.
17. Keep southward of the bar until signals are made for entering.

any case the river should not be entered without the assistance of a pilot.

Keep the marks on until the end of the South Barranca bears 260°; then steer 322° until the Barranca end is 249°. Thence steer direct for Flat Point; and having passed close to Main Point, steer close to Medano Point; and unless intending to proceed farther up the river, anchor in 3 fathoms water, mud, westward of a line joining Medano and Flat Points and out of the strength of the tidal stream.

From here to the town of San Carmen (or Patagones) the chart and the lead will suffice. If a vessel ground with a flowing tide, smooth water, and soft banks, she will not be injured; but, both for the bar and for the river, a local pilot should always be procured if possible. The banks alter more or less every year, although the main channel is nearly stationary.

For boats there is a safer entrance than the main channel. They should pass the South Barranca in 4 or 5 fathoms water and steer about 24° until some bare sand hills, rather inland on the northeast side of the river, are distinguished. Steering for the second of these hills (South Channel Hill), counting from the west, on a 33° bearing, will carry a boat at three-quarters flood into the river. At high water a vessel drawing 7 feet may thus cross the southwest bank.

This is called West Channel, though channel there is none; but it is safer for boats to enter by this way, because they run less risk from blind breakers, which are common in the main channel. Also, if any accident does occur, the shore is close at hand and the tide sets into the river.

**Tides.**—High water, full and change, on the bar during settled weather is at 11h.; springs rise 14 feet, neaps 10 feet. In the offing it is 3 hours later.

**Tidal stream.**—The tidal streams run parallel with the coast, with velocities of 2 to 4 knots an hour.

The ebb stream in the river runs at 2 to 6 knots an hour, according to the wind, the body of fresh water coming down from the interior, and the state of the offing tide. The flood stream seldom exceeds 2 or 3 knots an hour. When an unusually great body of fresh water is brought down, the ebb is at its strongest and, on the contrary, the flood stream is hardly to be noticed, though the water rises as usual.

Like all large rivers having their sources in mountainous countries, it is subject to periodical inundations. The river is tidal during the dry season to a few miles above the town of San Carmen, where high water is 2 hours later than at the mouth of the river.

# CHAPTER III.

## RIO NEGRO TO CAPE VIRGINS.

**Coast.**—From the Rio Negro the coast trends about west-southwest 22 miles to Bermeja Head, thence west and northwest 80 miles to Port San Antonio, at the head of the gulf of San Matias. The range of hills beginning with the South Barranca, 200 feet high, near Rio Negro, extends to Belen Bluff, 50 miles, with the slight break in Rosas Bay; their greatest height, 300 feet, is near Belen Bluff. From South Barranca to near Bermeja Head the land inshore of the cliffs is so level as to appear parallel with the water line when seen from the southeastward.

Rio Negro Bar is the only outlying danger between San Blas Bay and Port San Antonio.

**Gulf of San Matias.**—**Bermeja Head** is an excellent point to make when approaching Rio Negro, San Blas Bay, Port San Joseph, or Port San Antonio. It will keep a vessel clear of numerous dangers which attend the approach to either of these places on a parallel, a frequent and dangerous practice on this coast. In the vicinity of Bermeja Head the land is about 200 feet high.

Near the head are hummocks and irregular hills nearly covered with verdure. At the northeastern part of these are two peaks, very small, yet showing distinctly when seen from the eastward. They stand nearly over two peculiar cliffs, which so resemble each other that they are known locally as Dos Hermanas (Two Sisters), the name originally applied to the west point of Rosas Bay, which they resemble.

**Bank.**—Westward and southward of Belen Bluff the British vessel *Beagle* had deep water, excepting in one place where two successive casts of only 13 fathoms were taken, though the next cast gave no bottom; as the shoal ledge could not be found again without great loss of time, it was left unexamined; a ledge of rocks is certainly there, however, and perhaps with less than 13 fathoms. The water appeared light colored, although the night was very dark, and the lead had been carefully attended. In all other parts of the Gulf of San Matias there is deep water, with 30 fathoms 1 to 2 miles offshore.

**Tides.**—High water, full and change, at Belen Bluff is at 10h. 15m.

**Tidal streams.**—The tidal wave comes up the coast from the southward and rushes around Valdes Peninsula with much strength, causing violent and dangerous overfalls off Valdes Creek and Norte

Point. Part of the body of water thus going northward separates and runs around Norte Point; thence to port San Jose the stream sets strongly, with ripplings and races, dangerous for boats or very small vessels.

The main body continues its progress northward, inclining to the west, until near Belen Bluff, where it divides, one stream running to the northwest, the other to the eastward. Eastward of Belen Bluff the ebb sets faintly to the south or southeast; westward of the bluff it sets southeastward.

West of the meridian of Norte Point, the south point of entrance to the gulf of San Matias, and northward of latitude 41° 50′ south, but little tidal stream is felt, though the water rises 24 feet. With a weather tide there is a very short cross sea in the entrance of the gulf.

**Tide creek.**—At 10 miles westward of Belen Bluff there is a tide creek with depth of 3 or 4 fathoms at high water, but dry at low water. Westward of this creek begins another range of cliffs, about 100 feet high, extending with one break about 18 miles, the extreme point being named Cliff End. To these cliffs succeed low land with a shingle beach.

Near and inshore of the cliffs, westward of Bermeja Head, are irregular ranges of hills tolerably covered with rough verdure. Rosas Bay and Tide Creek appear when first made from seaward like openings in the land, and the hills and cliffs on each side like islands.

**Coast.**—From Cliff End to Villarino Point, a distance of 22 miles, the land is low, a few sand hills, partially covered with grass and stunted bushes, alone rise above the shingle or sandy beach. Villarino Point, on the eastern side of the entrance, is low and sandy, with a few hummocks, about 40 feet above high water, covered with rough grass and straggling bushes. Soundings will be obtained with the hand lead, only within a few miles from the land.

**Light—Villarino Point.**—From a square stone tower on stone house, painted in red and white horizontal bands and 23 feet high, there is shown a fixed white light with red sectors from an altitude of 122 feet above high water and visible, the white light 17 miles and the red 12 miles. For sectors, see Light List.

**Port San Antonio.**—The harbor is perfectly sheltered from every wind and small vessels may be laid ashore for a tide. It may, therefore, prove valuable, notwithstanding its remote situation and the barren nature of the surrounding country. Distant only 30 miles from the Rio Negro, which may perhaps be the medium of future inland communication between Chile and the coast of Patagonia, it is well situated for commercial intercourse with the interior.

The least depth on the bar seems to be about 15 feet.

The entrance, however, is much exposed to southeasterly winds, and at such times it would be imprudent for a sailing vessel to approach without a probability of speedily entering, as there would be a risk of becoming embayed on a lee shore and having to contend with a heavy rolling sea.

**Supplies.**—Game, fish, and fuel are abundant; water is to be obtained only by digging wells. Fresh meat can be obtained in any quantity.

**Telegraph.**—The town is connected by telegraph with Buenos Aires.

**Banks.**—On each side of the entrance is a bank, partly dry at low water and steep at the edges. Lobos Bank, on the east side, extends south 5 miles from Villarino Point, dries over 3 miles from the shore, and is steep-to, shoaling suddenly from 7 to 3 fathoms. Reparo Bank, on the west side, extends about 7 miles southward from Delgado Point, or as far south as the extremity of the drying portion of Lobos Bank.

The banks at the entrance are subject to constant changes.

**The outer anchorage** is good, in 10 to 30 fathoms water between the end of Lobos Bank and El Fuerte, as well as to the southward and eastward of the bank; the ground is quite clear, either fine sand or a soft greenish sandy mud. The shelter is good, excepting with southeast winds, which do not often blow, and still less often with violence.

**Inner anchorage.**—There is good anchorage, in 5 or 6 fathoms water, to the northwestward of the beacon near the subprefect's house and at a distance of about 600 yards from the coast. Small vessels can anchor farther to the eastward between the tail of Garxas Bank and the shore.

**Buoys and beacons.**—The harbor of Port San Antonio is marked by the following buoys:

Black conical buoy No. 1, moored 4¾ miles 197° from Villarino Lighthouse.

Black conical buoy No. 2, moored 3.6 miles 197° from Villarino Lighthouse.

Red conical buoy No. 3, moored 2.45 miles 207° from Villarino Lighthouse.

Red conical buoy No. 4, moored 600 yards 250° from Villarino Lighthouse.

Black conical buoy No. 5, moored 1,000 yards 334° from Villarino Lighthouse.

A red conical buoy, moored at entrance to Encerrada Creek, 1,200 yards 156° 30′ from Delgado Point Beacon.

The beacon on Rodriguez Point is quadrangular in shape, painted in black and white vertical stripes, about 30 feet high, surmounted by a staff and ball 11 feet high.

The beacon on Delgado Point is a metallic tower painted in black and white vertical stripes, 23 feet high. There is a beacon close southwestward of the subprefect's house and another near beach at San Antonio East.

**Directions.**—Approaching Port San Antonio, Direction Hill and El Fuerte Hill on the northwest shore of the Gulf of San Matias, will be seen before any of the low land can be made out. If approaching from the southward, El Fuerte (the Fort) is seen sooner than Direction Hill; if from the eastward, the reverse. El Fuerte, 380 feet high, singularly resembles a regular fortification. Direction Hill, 457 feet high, has three small hummocks close together on its summit.

Nipple Hill, 600 feet high and the highest land hereabout, is on a range of hills northward of the port, with a small hummock on its summit resembling a nipple. Steering toward the port, keep Direction Hill bearing 307° until El Fuerte bears 218°, from which position Nipple Hill will be seen in line with the hummock on Villarino Point bearing 27° 31′. Then steer in with the Nipple just open of the west extremity of Villarino passing close to the buoys marking the channel, leaving the black buoys on the port hand and the red buoys on the starboard hand. On rounding Villarino Point proceed to the most convenient berth.

If entering at night vessels should keep in the eastern sector of the mixed light, with the lighthouse bearing 16° 15′, until past buoy No. 2 when course should be altered for No. 3 buoy. For a large vessel the best time to enter is at about two-thirds flood, but for most vessels the last quarter ebb should be chosen for rounding the tail of Lobos Bank, so as to arrive, if possible, off Villarino Point at low water, after which there is little difficulty, the water being always smooth, and the only inconvenience the strength of the tidal stream. A sailing vessel may gain a sheltered berth by warping when the tide shifts.

**Tides.**—High water, full and change, at Port San Antonio is at 10h. 48m. The rise depends upon the wind, being at springs about 25 feet and neaps 23 feet.

**Tidal streams.**—Between Villarino Point and the Reparo Bank the tidal streams run 3 to 5 knots an hour, but southward of the entrance not more than one knot an hour, increasing rapidly as the vessel nears Lobos Bank.

**Sierras de San Antonio.**—Continuing along the coast southward from El Fuerte, the Sierras de San Antonio next attract notice. The

highest part of this peaked range is about 1,700 feet high, and visible 20 to 30 miles seaward.

All this west coast of the gulf of San Matias is bold, exposed, and steep-to. From the point of the Sierras southward the coast is chiefly cliffy, but with intervals of low land. The cliffs, 100 to 200 feet high, and nearly perpendicular, are composed of loose earth mixed with shingle and vast quantities of fossil shells. The shore is sandy and fringed by low-water rocks.

**Valdes Peninsula,** 53 miles long north and south, and 25 to 30 miles wide, is joined to the mainland by an isthmus 20 miles long and 7 miles wide, on the north and south sides of which lie, respectively, port San Jose and Nuevo Gulf.

Valdes differs in no wise from the pampas of the main. The land is very sparsely covered with grass and thorny, stunted bushes, and has long stretches of shallow, wave-like depressions, which give the impression of the greatest uniformity and barrenness, sometimes, however, interrupted by moderately abundant animal life of many kinds. Besides robins and sea and sand birds there are guanacos, the half-wild horses of the pampas, puncas, etc.

**Port San Jose** is a basin 24 miles long and 10 miles wide, with an entrance 2 to 3 miles wide; on each side of the entrance are bold cliffy headlands, 100 to 150 feet high, with deep water seaward; but a ledge extends from one to the other under water, causing, when the wind opposes the tidal stream, a heavy rippling.

The port is free from interior obstructions or dangers, with the exception of the shoal described below, but the entrance has an unpleasant appearance owing to the rocky ledge over which the water ripples so much that a stranger would hardly think it safe to enter. The least depth found in this channel was 11 fathoms, but the tidal streams set so strongly over the narrow ledge that sounding upon it is not easy.

**Shoal.**—A shoal with a least depth of 3½ fathoms extends for a distance of 2½ miles in a northerly direction from the south shore of the bay.

**Anchorage.**—The best anchorage is in the bight eastward of the eastern head, as northerly winds send a considerable sea into the southern bight.

It is reported that a short heavy cross sea gets up with any strong wind, although the gulf is nearly landlocked. Fuel may be cut in the southwestern part of the bay from stunted trees, but near the shore there is no appearance of fresh water. To the eye all is barrenness and desolation.

**Tides.**—High water, full and change, in Port San Jose is at 10h. 0m.; springs rise 30 feet, neaps 25 feet.

**Tidal stream.**—The tidal streams rush between the heads at rates of 3 to 5 knots an hour.

**Tidal races.**—A vessel of 80 tons, bound from Rio Negro to Port San Jose, was beset by one of the tide races when about 12 miles northeast of the entrance to the port. No bottom could be found with the lead. The sails were almost useless, notwithstanding a strong wind, owing to the violent motion of the vessel. Some of the crew ran aloft to avoid being washed overboard, and others ran below.

After being the sport of the waves during two hours, carried with the tide and unable to get clear, so much damage and inconvenience were caused that getting out of the race was followed by a change of purpose and the immediate return of the vessel to Rio Negro without again attempting to enter Port San Jose.

The races eastward of Norte Point and Valdes Creek are yet worse, but their height and violence vary as much as the winds and tides by which they are caused.

**Norte Point.**—From the east side of Port San Jose to Norte Point, 28 miles, there is a continuous cliff 60 to 100 feet high. No high land appears inshore; all looks low, bare, and sunburnt. No dangers are known to exist, but to small vessels the tidal races met between San Jose and Norte Point are troublesome, if not dangerous. Norte Point is lower than the adjacent cliffs. A reef extends off it for about a mile, but in the offing the water is deep.

**Rocky patches.**—From Norte Point to Valdes Creek, about 28 miles to the southward, the land is low, mostly a shingle beach. Off this piece of coast are the worst tidal races, caused by the rush of water across shoal and uneven ground lying 2 to 10 miles offshore southeastward of Norte Point and the rocky patches lying 6 miles eastward of Bajos Point. There are no marks on the land by which the shoals can be avoided.

In a sailing vessel it is at least prudent to avoid going nearer to this shore than 15 or 20 miles. Sometimes the overfalls extend 15 miles from the land and at others hardly 5 miles, depending on wind and tide.

**Valdes Creek,** 28 miles southward of Norte Point, may be known by the ending of the shingle beach, the land to the northward being low and to the southward high and cliffy; also by a line of cliffs beginning at Cantor Point, on the south side of entrance, and continuing southward to Ercules Point.

Ercules Point, 8 miles southward of Valdes Creek, is a white cliff 225 feet high. When first seen it appears perpendicular, or rather overhanging. Close northward of it are two perpendicular cliffs of the same height, off which a shoal ledge of tosca extends 2 miles seaward and 3 miles alongshore.

Valdes Creek is a dangerously deceptive inlet of a singular character. The entrance is usually 70 yards wide, but sometimes entirely blocked up by shingle. The tidal streams run most rapidly, 4 to 6 knots an hour, through the opening and up the long narrow passage extending to the northward, 4 to 6 knots an hour. A heavy surf breaks across the entrance when there is any swell.

The depth of water on the bar is quite uncertain, depending upon the time that has elapsed since a southeast wind has heaped up shingle at the entrance. The strong tidal streams scour out a channel as repeatedly as the gales block it up. It is an unfit place for any craft unless obliged to enter from some urgent cause.

In approaching, it is absolutely necessary to avoid the races, to keep well to the southward as far as Ercules Point, running then northward alongshore. The creek should be entered by a sailing vessel with the flood tide and the wind offshore, backing and filling, with the vessel's head to the southward. There is no room to work inside, and when bringing up headway, will be necessary to lessen the strain on the cable.

**Delgada Point,** the southeast point of Valdes Peninsula, is sloping and green and 200 feet high. A tosca ledge extends 1½ miles to the southward and eastward.

Lobo Peak, 210 feet high, nearly 6 miles westward of Delgada Point, from the southward appears double; it rises only 15 or 20 feet above the table range.

Nearly all the cliffy points between Valdes Creek and Nuevo Gulf have rocky ledges extending nearly a mile from high-water mark; in some places they extend still farther, and should be allowed a berth of 2 miles.

**Light.**—From a brick lighthouse with red cupola, about 25 feet high, erected about 80 yards from the edge of the cliffs on Delgada Point, is exhibited a group of flashing white light at an elevation of 233 feet above high water, and visible 22 miles. The keeper's dwelling, also of brick, with red roof, is attached to the lighthouse.

**Nuevo Gulf** is easily known by the two well-defined headlands of the entrance, Nuevo Head on the northeast and Ninfas Point on the southwest. Nuevo Head, 200 feet high, is steep-to, and no danger exists off it excepting a few tosca ledges close to the shore.

Ninfas Point, 7 miles southwest of Nuevo Head, is 243 feet high and makes as a double point; although bold to the eye, it ought not to be approached nearer than 2½ or 3 miles.

**Dangers.**—Rocks and tosca ledges extend east and east-southeast of Ninfas Point, and on the north side of the point a reef extends to the northeast nearly 2 miles. At 1½ miles from the shore the rocks dry at low water, with 7 fathoms close-to, and the tidal stream

rushes over them into Nuevo Gulf at rates of 5 or 6 knots an hour, causing with a westerly wind a heavy and dangerous rippling, the swell from which is felt entirely across the gulf and is dangerous for small craft or open boats.

In mid-channel there are no ripplings. The stream is sufficiently strong to carry a sailing vessel to windward while hove-to in a fresh gale. When once well inside the head it becomes weaker and the sea longer and more regular.

From the appearance of all the points on the south shore of Nuevo Gulf, it is probable that banks stretch off them. Vessels should give this shore a wide berth until properly surveyed.

The reported position of the shoal (East Point bearing 279°, distant 7 miles), with 2¾ fathoms over it, on which the *Gulf of St. Vincent* struck, was examined, but no indication of shoal water found. As, however, this examination was not very minute, the Gulf of St. Vincent Shoal is for the present retained on the charts. It seems probable that the bank on which that vessel struck is the one found by the *Flamingo*.

A shoal with 3¼ fathoms water over it and depths of 4 to 7 fathoms at ½ mile eastward and northward extends about 1½ miles north of Shoal Bluff, with East Point bearing about west, distant 1½ miles. Another shoal, on which the depth is 2¾ fathoms, lies about a mile north of East Point. Between these shoals are depths of 4 and 5 fathoms.

**Anchorage.**—On the south side of the gulf there are several good anchorages off the shingle or sandy beaches between the different heads.

**Cracker Bay,** the second bight westward of Ninfas Point, lies between two white cliffs from which, although bold looking like the rest of the projections on the coast, rocky ledges extend 400 yards, drying at low water, the only dangers in approaching the bay. A red house near the beach on the east side of the bay is somewhat conspicuous, and there is a large estancia in the valley close to the east cliff.

**Anchorage.**—There is a good anchorage in 10 fathoms, mud, nearly midway between the east and the west cliff, at ½ mile from the beach. The holding ground is good and the anchorage sheltered from the prevailing westerly winds, but an easterly wind would undoubtedly bring in a heavy swell.

The anchorage in Cracker Bay is little used. Occasionally one of the vessels of the Linea Nacional del Sud visits the bay for the farm produce, there being several estancias in the neighborhood.

**Tides.**—High water, full and change, in Cracker Bay is at 7h. 15m.; springs rise 13 feet, neaps 10 feet, approximate.

In April, 1871, a rise of 20 to 25 feet was observed by the officers of the British vessel *Cracker* in the western part of Nuevo Gulf.

**Port Madryn,** so named by the Welsh settlers of Chubut, the westernmost bight in Nuevo Gulf, is surrounded by a range of table hills 300 feet high. Between the hills and the shore intervene sandy hillocks, 20 to 40 feet high, thinly covered with brushwood, and the beach in several places is formed at the base of white cliffs, 50 to 80 feet high.

East Point and Cave Bluff, both on the south side of Port Madryn, are exceedingly white and the caves on the face of the latter show darkly. This port is the entrance and shipping port of all the products of the Territory of Chubut.

**Beacons.**—On Cave Bluff is a white truncated pyramidal beacon, surmounted by a staff with white framework globe, the total height above the ground being 28 feet.

The upper beacon is a high beacon located about 329 yards southward of a prominent house in (approximately) latitude 42° 45′ 30″ south, longitude 65° 05′ 00″ west.

There are several windmills situated inland of the upper beacon which may be mistaken for it.

**Tides.**—It is high water, full and change, in Port Madryn at 7h. 15m.; springs rise 13½ feet, neaps 10 feet.

**Shoals.**—A shoal with 2 to 3 fathoms water over it extends off Cave Bluff ½ mile to the northwest, where it is steep-to with 10 fathoms just outside, and ¾ mile to the northeast, whence the depth increases regularly to 5 and 10 fathoms.

From the old pier end at Port Madryn shoal water extends northeastward ¾ mile to the 5-fathom line, with a depth of 1¾ fathoms at ½ mile from the pier. Between the two shoals is a bight of anchorage ground with 7 fathoms at ½ mile from the shore.

**Landing** may be effected with on-shore winds at ½ mile eastward of Cave Bluff, and on the western side just clear of the rocks. More to the westward of the cave it is scarcely practicable, owing to the shelving of the shore, except between half flood and half ebb. Landing may also be effected about ½ mile north of the pier.

**Anchorage.**—Port Madryn affords a good anchorage in 10 to 12 fathoms, mud, at about ¾ mile from the shore and with Cave Bluff at about the same distance bearing 143°; at this anchorage the higher beacon should be in line with the end of the pier, bearing 288°. The British vessel *Amethyst* anchored eastward of the bluff, abreast the landing, and this anchorage was stated to be better.

**Piers.**—Port Madryn has no quays, but there are two piers, an old and a new one, distant 615 yards apart from one another. The new pier is 493 yards long and 45 feet wide at the seaward end. Vessels can lie alongside, with a depth of 18 feet of water at low water.

ordinary springs, ranging from 30 to 34 feet at high water ordinary springs. Railroad lines run the whole length of the pier, and wooden planking is laid down over all. There are 3 steam cranes on the pier. The old pier is used only for small vessels.

Both piers are connected with the railroad station and the new pier has a double track extending its whole length. Close to the new pier is a large warehouse for the stowage of goods on arrival.

**Lights.**—From a flagstaff at inner end of pier is shown a fixed white light, visible 5 miles, and from the outer end a fixed red light.

**Communications.**—The following lines of steamers visit the port: Pacific Steam Navigation Co., Merchants Line (to New York direct), Lloyd's Pacific, Roland Line, Linea Nacional del Sud, Compañia Argentina de Navigacion, Nicolas Mihanovich, and the Sociedad Anonima Importadora y Exportadora de la Patagonia. Various other lines maintain irregular service. A railroad line runs from Port Madryn to Trelew, a distance of 42 miles, and has recently been extended to Caiman and to Rawson; but it is to be extended a considerable distance up the river Chubut to Paso de los Indios, a distance of 250 miles. There is telegraphic communication between Buenos Aires and the southern ports of the Argentine, also with Trelew and Rawson.

**Semaphore.**—There is a semaphore on the north entrance point.

**Coal and supplies.**—About 500 tons of coal are kept in stock for the use of the railroad, and dry provisions in any quantity. Fresh beef and bread can be procured, and cavier and small crested partridges may be shot in the vicinity of Port Madryn, but they are not numerous; by giving notice beef, mutton, eggs, etc., may also be obtained from the Chubut colony at fairly moderate prices.

Fish of good quality, particularly smelt, may be caught in large quantities, either with the seine or with hook and line. Abundance of brushwood for fuel may be obtained.

**Pyramid Road.**—The northern part of the gulf is fringed with steep cliffs. In the northeast corner the Pyramid, a remarkable rock, forms the western point of Pyramid Road, which is sheltered and a good anchorage except with southerly winds. The best berth is with the Pyramid bearing west, or west by north; no tidal streams are felt here. In ordinary weather landing may be effected in a small cove in the northwest corner. There are three fresh-water lagoons about 6 miles north of Pyramid Road, but they are dry in summer.

There is a light railway to salt pans, in the interior of Valdes Peninsula, distant about 30 miles.

**Engaño Bay—Chubut River.**—From Ninfas Point the coast trends southwestward 40 miles to the entrance of Cubut River, in the southwest corner of Engaño Bay. This shore is cliffy, like the coast eastward of Nuevo Gulf, and with no outlying dangers.

In Engaño Bay, between the North and the South Cliff, the land is low and sandy, with many sand hummocks near the beach; the water is shoaler than near the higher land. Southward of the river is a range of table-land, 50 to 60 feet high, ending in white chalky looking cliffs. Castro Point is the northeast termination of the table-land.

**Welsh colony.**—The original settlers, chiefly from Wales, now established at Chubut (sometimes called Chupat), landed at Port Madryn in 1865. Their farms are scattered along the banks of the River Chubut for 23 miles from the sea; the village of Rawson is situated on the north bank, 4 miles from the mouth, and another, named Caiman, about 20 miles from the mouth.

The prosperity of the colony is increasing; the flocks and herds are rendered safe from drought by the water supply from the river through an artificial canal 20 miles long, fitted with sluices. The settlers are on friendly terms with the Indians, who bring horses, ostrich feathers, the skins of the guanaco and other animals to barter for groceries, spirits, and tobacco; the population of the territory is about 4,000, but several families had removed farther inland; there is a large and increasing influx of Argentines and Italians.

The Territory of Chubut consists of about 85,000 square miles, the River Chubut running through the territory.

The largest town is Trelew, with a population of about 1,400. It is probable that the seat of government, which is at Rawson, will eventually be transferred to Trelew, the latter containing all the chief houses.

The valley of the Chubut, in which Trelew and Caiman are situated, extends for a distance of about 30 miles into the interior from Trelew, and is populated chiefly by Welshmen. The valley has a very small rainfall, irrigation canals being extensively used.

The principal produce is alfalfa, of which three crops can be obtained per annum. Situated under the Andes and distant 450 miles from Trelew is another colony known as 16 de Octubre. This colony was founded in 1886 by 30 Welshmen from Trelew. Another colony, situated northeast of 16 de Octubre, is known as San Martin.

**Bar.**—The entrance to Chubut River, just where the sand hummocks end and the cliffy shore again begins, is partly concealed by a ledge of rocks which crosses it and at low water quite hides it from view; within the reef the water is at all times quite smooth. Between this ledge, which dries about 7 feet, and the beach, is a shifting bar with scarcely a foot of water on it when the tide is out, but with 12 to 15 feet at high water, according to the state of the tide.

Near the mouth the river is not more than 60 yards wide, and is 5 feet deep at low water; higher up it gets wider but not deeper; the

rise of tide gradually decreases and at Rawson is only 2 feet. At low tide the water is quite fresh at the bar.

Vessels of about 8 feet draft can in good weather and at high water, with the assistance of a pilot, enter the river. Larger vessels use Port Madryn, which is often the readiest way of communication with the colony, as the Chubut Bar is sometimes impracticable for a whole week.

**Beacon and buoys.**—Four red buoys mark the starboard side and one black buoy the port side of the channel at entrance to the Chubut River. A beacon with ball topmark is located on the eastern extremity of the reef on the port side of the entrance. It is 19 feet high.

**Pilot.**—Small craft wishing to enter may obtain a pilot by sending into the river; the Argentine harbor master and the pilot live 2 miles above the bar within sight of the anchorage.

**Anchorage** under very favorable circumstances may be had off the river in 5½ fathoms water, but altogether exposed. It is said that the anchor sinks into clay beneath the pebbles, and unless lifted at least every three days it is not likely to be recovered.

**Directions.**—Small craft wishing to enter Chubut River should employ the pilot. The river is free from obstacles, and the banks are firm and level. Boats or flat-bottomed barges might be tracked up by men or horses to a great distance. The best time to leave the river is before high water, with the last quarter flood, because the ebb on making sets directly on the reef.

**Tides.**—High water, full and change, at the entrance of Chubut River is at 5h. 30m.; the rise of tide on the bar is from 12 to 15 feet. The level of the water in the river remains stationary for 2h. 45m. at low water.

**Tidal streams.**—The ebb in the river runs 2 to 4 knots an hour; the flood is not felt more than 6 miles up the river.

Off the entrance the flood runs northward and the ebb southward, nearly in the direction of the shore, at rates of 1 knot to 2 knots an hour.

**Climate.**—The climate is dry and said to be very healthy. Fogs and mists are unknown; rain seldom falls in large quantities, and there is little or no dew.

**Communications.**—Trelew, 10 miles from Rawson, has railway and telegraphic communication with Port Madryn.

**Trade.**—The exports consist of wheat, butter, ostrich feathers, and skins of animals obtained from the Indians. Sheep and cattle have increased considerably, and the export of wool has risen materially; the Indian trade, however, has fallen away to a great extent.

Hides, wool, etc., are brought down from the interior to Trelew, where they are stored in large warehouses until required for export.

Branch railroads are in contemplation, which will materially reduce the cost of transport.

**Coast.**—From Delfin Point, 12 miles southwest of Chubut River, to Lobos Head and Union Point, the coast is high and bold, the water being deep and free from danger. The cliffs have a chalky appearance and consist of a light-colored sand and clayey earth, with dark horizontal strata.

At Delfin Point, 250 feet high, a small conical hummock, seen above the table-land, appears double, saddle-shaped, and rugged when made from the northward. Hidden Islet, 10 miles south of Delfin Point, so much resembles the near-by cliffs that it might easily be passed unnoticed. Union Point, 13 miles farther southward, is rather low and rocky, and here the character of the coast changes; bold cliffs and extensive ranges of table-land are no longer met with, the shore becoming lower and more uneven.

**Tombo Point,** 13 miles southward of Union Point, is low, with rocks off it and a ledge extending ½ mile to the northeastward. A depth of 7 fathoms was found at 200 yards from the shore, but the water appeared to be shoaler farther off. On the north side of the point, inside the reef, there is an anchorage called Janssen Bay, where small craft might find shelter from southeast winds, and here sealing vessels sometimes anchor.

**Tides.**—High water, full and change, at Tombo Point is at 4h. 30m.

**Janssen Bay.**—This bay lies immediately north of Tombo Point, and the entrance between Clara Point to the northward and Tombo Point to the southward is 3½ miles in width.

Clara Point, marked by a white cylindrical beacon, is clear of off-lying rocks, but a reef extends 1 mile northeastward from Tombo Point.

A reef extends from the coast in the middle of this bay.

A white cylindrical beacon is situated on the shore at 1½ miles southward of that on Clara Point.

**Anchorage.**—Vessels can anchor in a depth of 11 fathoms in the northern part of the bay eastward of the southern beacon or in a more sheltered position with good holding ground in Port Homero, situated in the southwestern corner of Janssen Bay.

**Atlas Point,** 6 miles south of Tombo Point, forms the northern head of Vera Bay. It is 70 feet high, and shows a smooth slope, which terminates in a low rocky point when seen from the northward or southward, but in a rugged ridge of rocks if seen from the eastward. A ledge of rocks under water extends off nearly 400 yards from the point.

Inland, between Atlas and Tombo Points, is Mount Triste, 300 feet high.

**Vera Bay,** nearly 2 miles southwest of Atlas Point, is an anchorage for small craft drawing less than 12 feet water, and is formed by a reef of rocks lying southwest and northeast nearly a mile long and 100 yards wide.

A vessel should enter from the southwest, remembering that in each entrance the depth is only 12 feet at low water, with a rocky and uneven bottom. Inside, opposite to the shingle beach, is a good berth in 15 feet at low water, bottom of coarse sand, shells, and sandy mud.

With a strong wind from southeast, a sea may be thrown into this corner, over and around the natural breakwater, from the beginning of the last quarter flood to the end of the first quarter ebb, during which time the reef is covered; the beach, however, does not show the effects of much sea. The tidal streams set through between the reef and the shore at the rate of about a knot an hour. The land close around the bay is low, but rather higher inland.

Two islets, with rocks near them, lie near the middle of Vera Bay, about 6 miles south of Atlas Point.

**Raso Cove.**—Cape Raso, the southern point of Vera Bay, is level and rather low, and there are a few rocks close to its extreme point. At 2 miles northwest of the cape is Raso Cove, a good anchorage with all winds excepting those between north by west and northeast. Several farmers have recently settled here. This cove is free from danger, but on the east side the ground is hard and stony; in the middle and near the west side there is good holding ground, composed of a stiff yellow clay, though sand may be shown by the hand lead. There is neither fresh water nor any firewood, except a few straggling bushes.

**Communication.**—The Argentine transport steamers call about every two months.

**Salaberria Reef.**—In approaching this part of the coast from the northward there are several rocks near the shore very little above water, and in the offing a considerable reef, named Salaberria, whose northeast extreme is a dry rock 4½ miles 116° from Cape Raso, and 10 miles 55° from Cape San Jose.

This ridge probably projects off from Cape San Jose, for there are two dry rocks in the same line of bearing, one at 1½ miles and the other at 3½ miles from the cape, besides several patches which break. The tidal streams set rather strongly along the shore, which is fronted by reefs for 2 or 3 miles off; great caution should therefore be used in approaching the coast, especially as the water is deep, and, if becalmed, it may be necessary to anchor in 30 fathoms water.

**Cruz Bay.**—Should Salaberria Reef be as continuous as it appears, there ought to be good anchorage in Cruz Bay, between Cape Raso and Cape San Jose. New Cove, also named Santa Cruz Bay, situated

close to the northward of Cape San Jose, is small and exposed to east winds. West Cove, in the southwest corner of Cruz Bay, has not been examined.

**Port Santa Elena** lies about 3 miles westward of Cape San Jose, and its approach may be easily known by the remarkable hummocky hills on this cape.

**Beacon.**—A beacon 40 feet high, consisting of a cairn of stones and a mast, stands on Santa Elena Peninsula, near the beach, but it is difficult to distinguish on account of the high land behind. The peninsula itself is quite low.

**Florido Reef,** which covers at three-quarters flood, is about 200 yards in extent, and lies about ¾ mile 274° from Acertada Islet. At ¼ mile westward, and the same distance northwestward from the reef, are banks with 12 and 16 feet water, respectively; both of these must be avoided in working into the port.

**Supplies.**—Guanacos, ostriches, armadillos, the cavia or Patagonian hare, wild ducks, partridges, snipe, and rail may be shot, but fish seem to be scarce. The guanaco affords an excellent food, but is a difficult animal to approach; one that was shot weighed, when cleaned and skinned, 168 pounds.

The water in the wells on the western shore of the port is too brackish for use, nor is fresh water to be obtained in any part of the harbor. Of fuel, a temporary supply may be procured from a small, shrubby tree which is tolerably abundant here. The Indians sometimes visit this part of the coast, but chiefly to bury their dead.

**Anchorage.**—The best anchorage is at the northwest corner of the port, in 6 or 7 fathoms water, but not too near the shore, for when the sea is heavy the ground swell breaks for some distance off; this swell, sometimes uncomfortable with moderate winds from south to south-southeast, is said to set in even with westerly winds.

Two rocks, about awash at low water, are reported to lie 100 yards off the beach westward of Santa Elena Peninsula, and kelp weed extends at least 300 yards from the inner part of the bay.

**The landing,** near the observation spot, is sometimes difficult on account of the ground swell. There are here some graves of seamen from British men of war.

**Tides.**—High water, full and change, at Port Santa Elena is at 4h.; springs rise 17 feet.

**Camerones Bay** lies between the south head of Port Santa Elena and Cape Dos Bahias, a distance of 22 miles, and in it the coast forms two bights, the southernmost of which is extensive and may probably afford good anchorage. The shore of the bay is rocky as far as Fabian Point, where it changes to shingle and so continues as far as the cape. About 12 miles northwestward of Fabian Point is Table Hill, conspicuous when bearing northward, but not

when bearing southward of west; its position is only approximate, but it is useful as a landmark.

At the head of Camerones Bay, about 10 miles northwestward of Cape Dos Bahias, there is a high rocky island with two lower and smaller ones to the east and north, all of them whitened by birds and so named Blancas Islands. Hermelo Rock, which very seldom breaks, lies about 188°, distant 2.8 miles from the southwestern islet; the soundings around the rock are very irregular.

According to an Argentine Government notice, two rocks that show at low water lie 2 miles south of Blancas Islands. The wreck of the steamer *Albatross*, sunk in 1899, lies with Blanca Island 22° 31′ and Moreno Islet 132°. There is 2½ fathoms water over the wreck, and a spar shows 3 feet out of water, to which a topmark has been attached. A buoy indicates the wreck, but often drags.

**Settlement.**—A small Scottish settlement has recently been made in the southern part of this bay. Camerones is a free port.

**Anchorage.**—Vessels anchor in 7 to 8 fathoms, sand and mud, off the settlement to the southward of Hermelo Rock. Cargo is discharged and loaded at the same time by the regular steamer by means of two lighters brought on the ship. No lighters are to be had from shore. Communication with shore is by the ship's boats, which land in the middle of the bay.

**Supplies.**—Mutton, and more rarely beef, can be obtained. Only rain water is used at the settlement.

**Communications.**—The Argentine transport steamers call every two months, and the steam vessels of the Hamburg South American Steamship Company call regularly.

**Tides.**—High water, full and change, in Camerones Bay is at 4m. 15m.; springs rise 16 feet.

**Tidal streams.**—Along the shore of Camerones Bay, and especially at the headland, the tidal streams run at rates of 1 knot to 3 knots an hour, nearly north-northeast and south-southwest, the water rising 8 to 12 and sometimes even 15 feet.

**Directions.**—The small Blancas Islands and Cape Dos Bahias are good landmarks for Camerones and can be made out at a distance. Coming from the south a good lookout should be kept for Rasa Islet, and, having passed it at a sufficient distance, the course set for Cape Bahias. Northwestward of the cape lies Moreno (Black) Islet, which is a good landmark. Now are seen also the houses of Camerones. A distance of ½ mile from the coast is kept until the anchorage is reached. Coming from the north, Blancas Islands should be steered for, and will be made at 7 to 8 miles; leaving the islets to starboard, a course is steered midway between the point of land and the *Albatross* wreck buoy and then to the anchorage off the settlement. The buoy lies east (N. 76° E. mag.) from the point of land.

This route is to be chosen only by day. Hermelo Rock lies 124° from the settlement. The bay is protected from winds between north-northwest and south. Vessels of any draft can enter or leave by day or by night.

**Cape Dos Bahias** is a rounded point, with a hill close to the sea on its most projecting part; a ledge of rocks extends nearly ½ mile east from the cape. Moreno Islet, 1¼ miles northwest of the cape and 200 yards from the shore, is high, rocky, and of a dark color; 2½ miles beyond is Carolina Cove, with a beacon on the eastern side of its entrance.

**Gregorio Bay,** about 6½ miles southward of Cape Dos Bahias and just northward of Leones Island, is exposed to southeast winds and is somewhat difficult to enter on account of the strong tidal streams setting past it; it offers, however, good shelter from the prevailing winds.

**Islets.**—Between Cape Dos Bahias and Gregorio Bay are Sola Island, about 90 feet high, and the Aguilones Islands, about ½ mile off shore; in the offing, about 4 miles from shore, is Arce Island, about 90 feet high. The islets have deep water near them and are, therefore, not dangerous.

**Rasa Islet,** 11½ miles 153° from Cape Dos Bahias, is a flat-topped gray rock, almost awash at high water; it lies in a north-northwest and south-southeast direction, and is divided into two nearly equal parts by a narrow channel.

Landing on Rasa Islet is difficult even when the sea is smooth, as the base of the cliff, forming the coast line, is so worn by the action of the sea as to overhang. The islet is frequented by seal hunters, and, during the season, a number of sea lions are captured.

A reef, supposed to extend ½ mile southward of the islet, is stated by Fitzroy to extend off 1 mile. A reef is reported to extend from a position about 600 yards southward of the island in an east-southeasterly direction for a distance of 2 miles. At night and during thick weather the islet should be approached with great caution.

**Gulf of St. George.—Leones Island,** off the northeast point of the gulf of St. George, and 7½ miles south of Cape Dos Bahias, is 279 feet high, 2 miles long, east and west, 1½ miles wide, and is covered with brushwood. A reef on which the sea always breaks extends nearly ½ mile from Lanaud Peninsula, the southeast extremity of the island; the isthmus between the island and the peninsula is covered at half tide.

**English Bay,** on the northern shore of Leones Island, is 300 yards deep and 200 yards wide, with 3 to 4 fathoms of water.

**Beacon.**—A stone beacon on the summit of Leones Island forms a good landmark.

**French Bay,** on the southwest side of Leones Island, is protected on the west by Ship Islet and on the south by Southwest Islet, which is low, rocky, and connected with Leones by a ridge that dries at half ebb.

Ship (Harbor) Islet is low and rocky, with shoal water extending some distance from its northwest point; at 400 yards west of the western extremity of this islet lies a dangerous rock, on which the sea generally breaks.

A French commercial house, engaged in the exploration of guano deposits and the shipment of fish oil, or blubber, has its chief settlement on Leones Island. Drinking water here is very scarce; some cattle for slaughter are kept.

**Landing.**—There is good landing on a gravel beach at the head of a small creek near the settlement.

**Anchorage.**—The northern entrance to this bay, between the northwest point of Ship Islet and the west extreme of Leones, is about 400 yards wide, with 12 fathoms water; the southern entrance, in which there is generally a heavy swell, and the southern part of the bay are very shallow. The anchorage, in 6 to 8 fathoms water, with good holding ground, is on the north side of Ship Islet, with its northwest point bearing about 263°; farther southward the water is much shoaler.

**Directions.**—In approaching this anchorage the set of the tidal streams determines whether to pass around the north or the south side of Leones Island. The flood stream runs strongly to the eastward round the northern side, between it and the mainland. The stream sets directly through the anchorage, causing eddies that will turn a ship round at her moorings against a strong breeze; this and the strength of the stream setting between the islets and the mainland are some objections to anchoring here.

**Leones Channel.**—St. Roque Point, on the mainland, about 1 mile west of Leones Isle, is low and rocky, with a hummock. A rock named Black Head, covered at high water, lies southwest of the point at about 200 yards. While the flood stream is running a vessel ought to give it a good berth, the set being rather toward it, or to the northeastward, at rates of 3 to 5 knots an hour. There is no other danger in the passage between Leones Island and the mainland.

**Landing.**—Passage Bay, 1 mile northeast of St. Roque Point, affords good landing.

**Tidal stream.**—The tidal stream sets to the eastward during the flood, crossing Passage Bay at the rate of 3 knots an hour and causing much rippling.

**St. Roque Bay.**—From St. Roque Point the coast trends northwestward ¾ mile to St. Roque Bay, which is nearly ½ mile deep and

at the entrance 400 yards wide. Anchorage in this bay can not be recommended, as the depths are irregular and a heavy swell occasionally sets in.

**San Antonio Peninsula,** 295 feet high, situated 1¾ miles westward of St. Roque Point, is joined to the mainland by an isthmus composed of gravel, 650 yards long and 140 yards wide. A rock, dry at low water and steep-to, lies near the west side of Cabo del Sur (South Cape), the south extreme of San Antonio Peninsula.

**Gill Bay,** formed by San Antonio Peninsula and the north shore, is about 1 mile deep and ¾ mile wide; in the middle of the bay lies Basin Bank (Half-Tide Island), rocky, 400 yards long, east and west, and covered at high water; there are depths of 4 to 5 fathoms close around it and 3½ fathoms at 300 yards to the southeast.

The Oven, an inlet at the head of Gill Bay, extends northward ½ mile and terminates in a lagoon, part of which dries at half tide; the entrance to the Oven is nearly 200 yards wide, with 4 fathoms water, decreasing to 2½ fathoms at 200 yards within; the cliffs rise perpendicularly on both sides to heights of 160 and 190 feet. The lagoon abounds in shellfish.

**Beacon.**—A cairn beacon with staff stands on the summit of San Antonio Peninsula.

**Water.**—A well of fresh water in the northern ravine on the east side of the Oven afforded excellent drinking water during the stay of Capt. Olry, of the French Navy, 1876.

**Anchorage.**—The best anchorage in Gill Bay is in 8 fathoms water, 600 yards northwest of Basin Bank. Southerly gales send in a heavy swell.

Gill Bay is reported to be preferable to Egg Harbor as an anchorage, the bottom being mud, the space less limited, and the access easier. If the wind be from the northward, it is very difficult to turn in Egg Harbor when leaving; whereas in Gill Bay a vessel can proceed out eastward of Basin Bank. A bearing of the western entrance point of the Oven, which is conspicuous, will clear this bank.

**Egg Harbor (Port San Antonio)** lies between San Antonio Peninsula and Valdes Island, the latter being nearly 1 mile long, west-northwest and east-southeast, nearly ½ mile wide, and 230 feet high. It is sheltered from all but southeast winds and is one of the best ports on the coast. Small vessels may enter at either end of Valdes Island, steering by the eye, as there is no hidden danger. Southerly winds send in a good deal of swell, but cause no further inconvenience. The southern entrance is about 400 yards wide, with general depths of 8 and 9 fathoms; at 300 yards from the east extreme of Valdes Island there is a 4¾-fathoms spot, with 6 to 7 fathoms close around it. The northern entrance is 450 yards wide, with 9 to 18 feet water.

**Supplies.**—Excellent fish may be caught in this harbor; rabbits are found on Valdes Island. A short distance inland small and crested tinamu, swans, geese, ducks, and a few snipe may be shot.

**Anchorage.**—The best anchorage in Egg Harbor is in about 6 fathoms, gravel over clay, with the north extreme of Valdes Island in line with south extreme of Cayetano Islands bearing about 255°. Small vessels may anchor near Valdes Island.

**Tides.**—High water, full and change, in Egg Harbor is at 4h. 0m.; springs rise 17 feet.

**Tidal streams.**—The flood stream sets through the harbor from west to east at the rate of about 1½ knots an hour; the ebb is scarcely felt.

**Los Frayles,** 1¼ miles southwestward of Valdes Island, consist of three rocks nearly awash at high water, with deep water close around them. At 1 mile 33° from Los Frayles and ¾ mile 269° from north point of Valdes Island is a rock on which the depth is 4½ fathoms.

**Cayetano Bay,** 2 miles westward of Egg Harbor, is partially sheltered from southerly winds by the Cayetano Islands, which extend nearly a mile east by north and west by south. The southern entrance, between the islands and Guanacos Point, is ½ mile wide with depths of 8 to 11 fathoms. The northern entrance is about a mile wide with 12 to 18 feet water.

**Water.**—Moderately good drinking water may be obtained by digging in the gravel some distance from the beach in a valley on the northeast side of Cayetano Bay.

**Temporary anchorage.**—Small vessels may obtain temporary anchorage in 4 to 5 fathoms, gravel, with the east extreme of the larger Cayetano Island bearing 195°, distant about 400 yards.

**Arredondo Bay,** the entrance to which lies 2 miles westward of Cayetano Bay, affords shelter for small vessels. There is generally a swell setting into this bay, but the holding ground is good.

**Pan de Azucar Island,** lying nearly 2½ miles west of Los Frayles, does not resemble a sugar loaf; its summit, 176 feet high, is uneven and rocky. There are rocks and reefs close around it, and dangerous ones between it and San Pasqual (Molino) Reef, 4 miles to the westward, Castillos Point, and Port Melo. This locality is little known and must be avoided.

**Port Melo.**—About 2 miles west of Arredondo Bay the coast recedes and forms a bay 3 miles wide and 2½ miles deep, having in it two groups of islets, the southern named Escobar and the northern Laguna; between these islets and the eastern shore of this bay lies Port Melo, the north and northwest parts of which dry at half tide.

**Anchorage** may be had in Port Melo in about 4 fathoms water, with Portugal Point, the east entrance point, bearing about 127°;

the best position is in 5 fathoms, sand, with Portugal Point bearing 172°.

It is very rocky and too much exposed to southerly winds to be valuable as a port.

**Tides.**—High water, full and change, at Port Melo is at 3h. 40m.; springs rise 15 feet.

**Tidal streams.**—The tidal streams off this part of the coast are strong, running along the land at rates of 2 or 3 knots an hour. Off the projecting points and in confined passages the strength is, of course, increased and causes heavy ripplings when opposed to the wind.

**Castillos Point (West Point),** 3½ miles west by south from Portugal Point, is fringed by rocks, some extending more than 200 yards from the shore; at ¾ mile to the southeast are the Cangrejos Rocks, and on the southwest side of Castillos Point there are several islets and rocks, the principal being Long Islet, Flat Islet, and White Rock; landing may be effected on the mainland abreast of Flat Islet.

Between Castillos Point and Cape Aristazabal, 25 miles to the westward, are several bights and coves, but none suitable for anything larger than a decked boat.

**Tova Island,** 6 miles southwest of Port Melo, is 4 miles long, southeast by east and northwest by west, and 1¼ miles wide where widest. It is divided at high water into four parts; the westernmost and largest, 128 feet high, is covered with vegetation; the easternmost is low and rocky, terminating in East Islet. From September to April the island is covered with penguins, and in the valleys there are quantities of guano.

At ¾ mile eastward of East Islet lies a dangerous reef, covered at high water; in the channel between there are depths of 8 to 12 fathoms. Several rocks above and below water lie off the southwest shore of Tova Island, the principal one, Goëland Rock, a little over a mile from the west extreme of the island.

**Supplies.**—Quantities of fish may be caught with the seine in the channel between the islands. Shellfish are also plentiful, but cause colic. Water may generally be obtained at Watering Point from rocky pools of rain water. At Castillos Point, on the mainland, partridges, hares, and guanacos may be shot, but the landing is bad and sometimes dangerous.

**Penguin Rock,** covered at high water, lies ¼ mile northward of East Point, the northeast extreme of Tova Island.

**Anchorage Bay,** 1½ miles west of East Point, affords a well-sheltered anchorage in 4½ to 5 fathoms water, bottom of gravel over clay, with the middle of Gull Islet, bearing east, distant 700 yards. The heaviest squalls are from southwest. In running in to the anchorage a vessel should keep in the middle of the entrance, because

Bretons Point extends to the eastward under water, and the water is shoal at the west end of Gull Islet; the islet is connected at low water with Tova Island.

**Beacon.**—Gull Islet has a stone pyramid on its northern part.

**Northwest Bay,** 1 mile west of Anchorage Bay, affords good anchorage in 7 fathoms, gravel and clay, with the pyramid and beacon on the western shore in line, bearing west, and a short distance eastward of the line of the two beacons on the southern shore. These leading marks on the south shore, when in line bearing 192°, appear to lead very close to the westward of Sea Lion Rock.

**Sea Lion Rock,** which covers at high water and has depths of 8 to 12 fathoms close around it, lies ¾ mile north of the northwest extremity of Tova Island; it always breaks.

**Medrano Rocks and Robledo Islets.**—Medrano Rocks are a dangerous cluster, awash at low water, lying 2 miles 151° from East Islet; the sea breaks upon it with violence at most times.

At 5½ miles 282° from these rocks and 2¼ miles from the southwest side of Tova Island lies Great Robledo, consisting of three islets about half a mile in extent; Little Robledo lies 1½ miles 296° from Great Robledo, with depths between of 11 to 23 fathoms, over rock.

**Breakers.**—Breakers apparently indicating the existence of rocks, the position of which are doubtful, were observed by the Argentine cruiser *Buenos Aires* in 1911; their approximate position were 33° distant, 1,400 yards and 8° distant 1½ miles, respectively, from Little Robledo Island.

**Tides.**—High water, full and change, in Anchorage Bay, Tova Island, is at 3h. 45m.; springs rise 18 feet.

**Tidal streams.**—A strong tidal stream is always setting through between the island and the mainland.

**Bustamente Bay—Lobos and Galiano Islands,** lying inshore to the westward of Tova, are beset with rocks. Inside these islands is Bustamente Bay, open and exposed to southeast winds; several rocks lie near the middle. There is anchorage in 4½ fathoms about in the middle, between the south coast and Isabel Island. The anchorage, according to a report of Capt. Hempstead of the *Elizabeth Hamilton*, is very unsafe; from 1846 to 1850 a number of vessels were lost on the rocks in the vicinity.

The Viana Islands lie 4 miles eastward of Port Malaspina; 1½ miles eastward of the largest is a reef on which the sea generally breaks; in other directions they may be approached with safety.

**Port Malispina,** separated from Bustamente Bay by Gravina Peninsula, is a mere rocky inlet, only fit for a boat; a southerly gale on this coast drives in a heavy sea. The land in general is 100

to 700 feet high, Pineda Paps, about 10 miles inland, being 664 feet high; it has everywhere a barren, desert appearance, destitute of verdure.

**Cape Aristazabal,** about 2½ miles southward of Port Malaspina, has deep water close-to excepting at ¾ mile to the southeast, where there is a reef which breaks at half tide.

The British steamer *Brenda* (1893) foundered on a sunken rock reported as lying about 1½ miles east of Cape Aristazabal, and as no detailed examination has been made of the vicinity it should be given a wide berth.

**Tidal streams.**—Off the cape the flood stream sets northeastward at about 2 knots an hour; the ebb sets southward.

**Coast.**—From Cape Aristazabal to Cordova Cove, 46 miles to the southwest, the land gradually rises; a range of tableland is seen, increasing in height as it extends southward. There is no known danger between these places excepting a rock off the Quintano Islands, which lie 7½ miles westward of the cape. The soundings are regular, the tidal streams scarcely felt, and the coast is steep-to and bold. Southward of Quintano Islands high light-colored cliffs fringe the shore and continue as far as Cordova Cove.

**Salamanca Peak,** about 11 miles northward of Cordova Cove, is a cone of regular shape, about 700 feet high, which shows distinctly above the high ranges of table-land, and is visible in clear weather 30 miles.

**Cordova Cove,** rocky and shallow, is almost unfit for any vessel. A reef extends half a mile eastward and southward from the northern point of the cove, and 2 miles northeastward of the point lies Novales Shoal, a small rocky ledge under water. At 5 miles southward of the cove and 1 mile offshore are the Ali rocks, covered at high water, but indicated by the breakers. There is no other known outlying danger between Cordova Cove and Cape Three Points, the southern point of the Gulf of St. George.

**Borja Anchorage,** near Borja Point, according to information from the Argentine vessel *Guardia Nacional*, is better suited as a discharging and loading place than the other bays in the vicinity, on account of its position in the neighborhood of the road leading to the colony of Sarmiento and its more suitable beach for landing and embarking or the shipment of goods. The anchorage is indicated by a wooden pyramidal buoy, red above and white below, moored in 4 fathoms at low water, bottom clay.

**Tilli Road,** northward of Marques Point and 14 miles southwest of Cordova Cove, affords tolerably good anchorage during westerly winds, in 5 or 6 fathoms water, clean sandy bottom, but is open to winds from north through east to south.

The position of the roadstead may be recognized by its lying between the second and the third prominent bluff southward of the lower land about Cordova Cove. The beach is level and sandy, but so much swell generally breaks upon it that landing is difficult. There is plenty of firewood near the shore, and a salt pan of fine white salt.

The settlement in this bay is developing rapidly and forms the post for the colonies of Sarmiento and San Martin, situated about 180 miles to the westward and connected with it by telegraph. It is a free port.

**Light.**—A fixed light with red and white sectors and known as Commodoro Rivadavia is shown at an elevation of 90 feet above high water from a white house 19 feet high in the center of the bay. The white light is visible 13 miles and the red light 8 miles. (For sectors see Light List.)

**Anchorage.**—Vessels anchor in depths of 7 to 8 fathoms, small stones, and sand bottom. The road is protected only from winds between north-northwest through west to south-southwest and can not be recommended. In stormy, easterly winds vessels should not remain. No lighters can be obtained for loading or discharging cargo.

**Landing** is difficult, owing to the swell that generally breaks on the shore, and at low water is impossible. In easterly winds the signal should be made "Is it possible to land." The answer will be made from the subprefecture by means of the International Code. Boats usually land in the middle of the bay, between the north and south reefs.

It is stated that the anchorage at Point Borja to the northward is preferable to that of Tilli Road, and that landing can be more easily effected.

**Coast.**—At the head of the Gulf of St. George, from Tilli Road to a cliffy bluff named Cape Murphy, 35 miles, the shore is low, generally a shingle or sandy beach without cliffs or rocks, with regular soundings in the offing.

Between Cape Murphy and Casamayor Point, 28 miles, the shore is rugged and broken, and very little cliff is seen until the latter point is reached, where the land again rises into Espinosa Heights, a high ridge fronted by precipitous cliffs. Thence to Cape Three Points the coast for 48 miles is cliff, rock, sand, or shingle, in disconnected portions.

**Olivia Cove.**—About 8 miles northwestward from Cape Murphy is a deep and well-sheltered cove, named Olivia. This cove is the only place along this part of the coast where a vessel can discharge cargo, the coast southward of Cape Murphy being fringed by a bank of

rocks, making it inaccessible. Small vessels, about 800 tons, can enter the cove; larger vessels may anchor at the entrance in 7 fathoms, sand and shells.

**Beacon.**—A beacon, 33 feet high, the lower part painted white and upper part red, was erected in Olivia Cove in 1901, and is said to be visible in clear weather 10 miles.

**Cape Three Points (Tres Puntas),** in latitude 47° 6′ south, longitude 65° 50′ west, may be known from seaward as the termination of a long range of table-land trending north and south. A short distance southeastward of the northern end of the range is a remarkable conical sugar-loaf hill, 250 feet high, attached to the main range, though rather a straggler; there is also a small sharp peak rather northward of the fall of the range.

The cape shows three distinct upright heads of a light-colored earthy cliff; off these heads ledges of rocks extend ½ mile seaward, and over them the tidal streams rush and ripple with violence; at 1 mile from the shore there is no danger.

From Cape Three Points to Cape Blanco, 8 miles to the southeast, the coast is low, rocky, and fringed with kelp, with table-land inshore. Salt lagoons extend for many miles inshore of these points.

**Cape Blanco,** 8 miles southeast of Cape Three Points, makes as an island; three distinct masses of rugged rock, about 130 feet high, are connected to the mainland by a low, narrow isthmus. On each side of the isthmus is a small cove; that on the south side is sheltered excepting from south to east; a very small vessel might obtain tolerable shelter from all winds by anchoring in 4 to 6 fathoms water, close to the end of the kelp, in the northeast corner of the cove.

A vessel intending to anchor here should make great allowance for the tidal streams. The flood sets with force over the bed of rocks ½ mile northeastward of the cape, which would prove extremely dangerous if drawn among them. The beach around the cove is rather steep and is formed of shingle, here and there mixed with dark sand. Plenty of firewood may be cut a few yards from the beach on the southwest side of the cove, but there is no appearance of fresh water.

**Byron Shoal.**—Between Capes Three Points and Blanco is Byron Shoal, about 6 miles long northwest and southeast, and about ¼ mile wide. A depth of 23 feet has been reported over this shoal, but there is probably less water in some places; the soundings are irregular and the locality should be avoided. Ripplings and overfalls, more or less violent, according to the time of tide and direction of the wind, point out the position of the shoal.

The north end of Anne Shoal is 7 miles 102° from Cape Blanco. It has 6 fathoms water over it and extends in a southerly direction

for 2 miles. Between these shoals there is a passage 2 miles wide, and the depth gradually increases to more than 15 fathoms.

Within these shoals are two others. A small one, with a depth of 1¾ fathoms, lies 2¼ miles 125° from Cape Blanco; and another 1¾-fathom bank, named after the cutter *Susannah*, 2½ miles long, north-northwest and south-southeast, and nearly a mile wide, lies with its northern end 7 miles 152° from Cape Blanco.

There is probably more shoal ground to the northeastward, as with Cape Three Points bearing about west-southwest the depth rather suddenly decreases from 40 to 14 fathoms, pebbly bottom, about 10 miles within the 50-fathom edge of the bank. On approaching the land the quality of the bottom becomes irregular, changing from ooze to sand, with pebbly shoal patches, so that by attention to the soundings and nature of the bottom these shoals may be avoided.

A good guide to avoid these shoals is not to approach so near as to see the rugged hillock of Cape Blanco and to keep the high land of Cape Three Points, which is visible from the deck about 20 miles, on the horizon.

**Tidal streams.**—At full and change, the flood or northerly stream ceases in the offing at about 4h. 15m., but near Cape Blanco and among the shoals the tidal streams may be less regular. They produce strong ripplings and set at rates of 3 to 4 knots an hour around Cape Three Points.

**Coast.—Rivers Peak,** about 20 miles south of Cape Blanco, is isolated, visible 20 miles in clear weather, and when bearing west shows northward of a table-topped range southeastward of it. The latter has a fine steep bluff at its southern end.

The coast line between Cape Blanco and Port Desire is low and imperfectly known. Within 3 to 5 miles from the shore there are several patches of rock, which uncover at half tide, but beyond this distance the coast is free from any known danger and may be approached to a depth of not less than 15 fathoms; within this limit the ground is foul. Within 3 miles of Port Desire the land becomes high and cliffy.

**Port Desire,** at the mouth of Desire River, has a rather difficult entrance, as, in addition to the strength of the tidal streams, it is narrow and rendered still more contracted by the several reefs that lie off the north shore or nearly in mid-channel. The north point of entrance is a steep bluff and therefore remarkable, being the only point of that description along this part of the coast. Direction Hills, 420 feet high, about 4 miles to the northwest, show out well and should be easily recognized at some distance.

**Light.**—From the flagstaff situated a few feet eastward of the subprefect's house, about 200 yards southwest of the highest build-

ing of the ruins, is shown an occasional fixed red light. This light is of very low power, unreliable, and unwatched.

**Sorrell Ledge** lies 4 miles 37° from Seal Island; at ¼ mile seaward of the ledge the depth is 13 fathoms. Tower Rock, a hill on the south side of the port, 1½ miles within the entrance, and very conspicuous, becomes visible soon after passing this ledge, opening out when North Bluff bears about 243°.

**Seal Island,** at the northeastern point of the rocky entrance, is white with guano, and shows well against the dark-colored bluff behind it when seen from the northward. Black rocks extend from Seal Island in a southeasterly direction. At low water, when many of the rocks are uncovered, is the best time to enter the port.

**Chaffers Ledge,** on the south side of entrance, can usually be distinguished by the breakers on it. The tidal streams run 5 to 6 knots an hour, drawing under the kelp, but at low tide the kelp shows near the ledge and may be passed close-to.

**Beagle Rock,** with 9 feet of water over it at low water, near the middle of the channel, is very dangerous, giving no indication of its existence. All other dangers show by the breakers on them.

**Shingle Point—Range Beacons.**—Two range beacons on Shingle Point, when in line of bearing 284°, lead 197 yards southward of Beagle Rock. The front beacon, named Estacion, is an iron truss with staff, 49 feet high, the whole painted white and elevated 72 feet above the sea. The rear beacon, named Alonzo, is 931 yards 284° from the front beacon, and consists of an iron frame with truncated cone, painted white, 65 feet high, and elevated 105 feet above the sea.

**Rock.**—The captain of the steamship *Presidente Quintana* reported (1910) that at 3 miles from the coast and 2 miles southward of the entrance to Port Desire, his vessel touched a rock, with depth of 3 fathoms over it.

**Settlement.**—The failure of the water supply has necessitated the removal of the settlement to the south shore. Shipwrecked crews are assisted here by authority of the Argentine Government. The Argentine flag is hoisted when a vessel is sighted, but this flag can only be seen when Tower Rock opens. The ruins of the old Spanish settlement, established in 1829, were, in 1883, in a good state and are in possession of the present settlers. Cabbages, parsley, cherries, and quinces remain in the gardens planted by the early Spanish settlers.

The inlet was examined by the British man-of-war *Beagle* as far as a boat could go, and from a neighboring hill it appeared at that time to be fed by a very small, winding stream; but from the broad, level ground and muddy flats on either side of the stream and the steep cliffs bounding them it appears probable that they form the bed of a large river at certain periods of the year.

**Communications.**—The Hamburg-South American steamers make fortnightly trips to Buenos Aires and down the coast; also the Mihanovich Line from Buenos Aires down the coast to intermediate ports and Port Gallego and the Straits.

A transcontinental railroad from this port is under construction.

There is weekly mail service with Buenos Aires and telegraphic communication with Buenos Aires, Bahia Blanca, and ports to the southward.

**Wharf.**—It is the intention to construct a wharf at the high bluff on the northern shore where large ships may lie and discharge. Preliminary surveys have been made by a Government steamer. Alongside the bluff there is a depth of 35 feet.

**Tug.**—There is a small tug in the port to tow lighters, of which there are three with capacities of 50, 150, and 300 tons, but the tug is unable to tow a lighter against the tide when running at its maximum strength. The master of the tug acts as harbor master and pilot. The rate of discharge is not over 100 tons per day.

**Labor.**—The laborers are Indians and scarce.

**Water.**—Water for drinking purposes and for boilers is brought off by the tug in quantities of 2 tons at a time.

**Provisions.**—Mutton is plentiful, but poor. Beef is procurable once a fortnight; vegetables occasionally when brought from the interior, and are very expensive. Fruit is unknown. Dry stores are plentiful but expensive. Shellfish, wild fowl, and guinea pigs are plentiful 3 to 4 miles up the river, also partridges and hares.

**Coal.**—There is no coal for sale.

**Hospital.**—There is a small hospital, with a capacity for 30 patients, where treatment may be obtained but no food, which must be supplied from the ship.

**Winds.**—The prevailing winds are from southwest to northwest; sudden heavy gales appear to be prevalent, rising without warning. The southwest winds generally die out during the night, but the northwest winds continue to blow for days. Southeast winds are uncommon and bring strong but short-lived gales.

**Outer anchorage.**—Temporary anchorage will be found in 7 fathoms water, well sheltered from westerly winds, with North Bluff bearing 325° and Tower Rock 277°; this position being a little southward of the fairway of the port and about 1½ miles from the nearest shore, is out of the strength of the tidal streams. The bottom is strewn with rounded stones, but the holding ground, although of so suspicious a character, appears to be good.

**Inner anchorage.**—Vessels entering should anchor in the center of the river with the beacons bearing 91° 30′ and Tower Rock 158° 30′. If this anchorage is occupied favor the southern shore in select-

ing another berth. In any event do not anchor under the northern shore near the high bluff, as the holding ground is poor and the vessel will sheer about at the anchorage. Steam should be kept on the boilers and an officer should always be on watch at night. If the ship is not carefully tended she may be caught with a foul anchor, with the tide making rapidly.

**Directions.**—By waiting for low water all the dangers will be seen, and a sailing vessel may be dropped in with the flood if the wind be westerly, as usual. If fair, it will be advisable for the vessel to be in the entrance at slack ebb or a little before. As the water is deep on the south shore, there seems to be no real danger that may not be avoided by a careful lookout for kelp, which always grows upon and therefore plainly indicates the existence of rocky ground. It must be remembered that the chart is little more than a sketch.

When approaching from the northward, vessels should give Seal Island a berth of not less than 1 mile, steering for the white cliffs in the bight southward of Chaffers Point, and when the triangular patch on the distant hills is in line with Shingle Point, bearing about 280°, steer for it on that bearing until the beacons on Shingle Point are seen. These, in line bearing 281°, lead between Chaffers Ledge and Beagle Rock in not less than 5½ fathoms at low water.

When Seal Island bears 51° the vessel, being abreast of Beagle Rock and past Chaffers Ledge, should borrow toward the south shore, which is steep-to; but between Shingle Point and the settlement shore, where the tidal stream is very strong, it is recommended to keep in mid-channel. When past Shingle Point sheer over to the north shore, out of the strength of the tidal stream, and anchor off the ruins of the old settlement.

**Tides.**—High water, full and change, at Port Desire appears to occur at 1h. 20m.; springs rise 18½ feet.

**Tidal streams.**—The tidal streams set in and out of the port with regularity. At neap tides the tidal current flows from 3 to 4 knots and at spring tides from 5 to 8 knots per hour. The interval of slack water is only about 5 minutes. It should be borne in mind when approaching any part of the coast between Union Bay and Port Desire, that there is a difference of half a tide, or three hours nearly, between the turn of the tidal stream in the offing and the time of high water in the harbors. The flood or northerly stream in the offing runs from three hours before high water by the shore until three hours after high water; the ebb the reverse way.

**Caution.**—When lying at anchor in Port Desire careful watch must be kept, as there is great danger of dragging. Steam should be kept up at all times. It is especially dangerous at change of tide.

**Sea Bear Bay.**—Penguin Island, situated off the northeast point of Sea Bear Bay and 11 miles southeast of Point Desire, is about 150 feet high, bold on the eastern side, and may be passed close-to, for the tidal streams set off rather than toward the shore. There are a few huts on the island apparently deserted, though probably used in the sealing season.

Sea Bear Bay is one of the best anchorages on the coast, but difficult of access for sailing vessels without a fresh leading wind on account of the strong tidal streams which set through the narrow channels between Penguin Island and the coast. Though an anchor might save a vessel from driving ashore, the bottom is very foul, and she would not be likely to recover it.

**Rock.**—Dries Bank, shown on the charts as extending 1,500 yards in a northerly direction from Penguin Island, has, at its northern extremity, a rock which is visible only at low tide, but which is easily recognizable at all times on account of the broken water in its vicinity. There is a rock nearly awash at low water at its southern end.

**Light.**—From an iron tower, 34 feet high, painted with one white and two red horizontal bands, and the lantern with white base and red cupola, based on a white stone tower, 39 feet high, with keeper's dwelling of the natural brick color at the foot of the tower, at the southeast extremity of Penguin Island, is exhibited, 181 feet above high water, a group flashing white light, visible 21 miles through an arc of 220° between the bearings 170° and 30°.

There is a signal station at the lighthouse.

**Supplies.**—There is no wood of any size to be procured in Sea Bear Bay, and the few gallons of water that may be collected in the wells, situated immediately within Wells Point, are too precarious a dependence to be worth attention. The passage to these wells is over a small rocky bar, which a boat may cross at three-quarters flood.

There is a small spring at the north end of the third sandy beach, which a herd of guanacos was observed to visit every morning, but as the water only trickles down in a very small quantity, it can afford only a temporary supply. Beyond being a secure anchorage, this place affords no advantage except for sealing vessels while employed in their occupation on Penguin Island.

**Beacons.**—Leading beacons, placed 410 yards apart on a bearing of 174° and 354° from each other, have been established on Penguin Island to lead to the anchorage. The rear beacon, situated near the summit of the island, consists of a mast with crosstrees 45 feet in height, standing on a cairn and surmounted by a latticework triangle; the upper half of the beacon is painted red and the lower half white. The front beacon is similar, but has a square topmark, and the whole is painted white.

**Directions.**—In entering the bay, border pretty close to Wells Point, the low rocky south point of entrance, in order to avoid May Reef, which lies about ½ mile 26° from the point; but as the reef always breaks, the eye, with a due consideration of the tidal streams, is the best guide. The reef extends for some distance eastward of the breakers.

Within the reef the streams set in or out of the bay, but with little strength. There are depths of 12 or 13 fathoms off the reef; then the water shoals for one or two casts of the lead to 7 fathoms, after which it deepens again. The vessel may then haul across the bay and anchor in 4 fathoms water, with Wells Point bearing 105° distant about ¼ mile, avoiding the kelp which projects from the sandy beaches.

For further directions the plan of the bay will be the best guide. When once in, the anchorage is good and protected at all points except between northeast and east. From the appearances of the beaches it is not probable that a heavy sea is often thrown in.

Should a vessel not be able to enter the bay, there is anchorage off Wells Point, between it and the reef, on (it is said) tolerably clean ground.

**Tides.**—High water, full and change, in Sea Bear Bay is at 0h. 45m.; springs rise 20 feet.

**Tidal streams.**—The tidal streams off the entrance are very rapid and form strong ripplings even in a calm, while in a breeze they must be very dangerous for boats and, indeed, not agreeable for vessels of any size. The flood sets northeastward and has been observed to attain a rate of 3 knots an hour against a strong northerly wind. The ebb sets nearly in the opposite direction and at about the same rate. Off Penguin Island the northerly stream ceases at about four hours after high water by the shore.

**Spiring Bay,** between the south head of Sea Bear Bay and Shag Rock, 10 miles to the southward, forms a deep bight, but is quite open to the south and east, and after a southwest gale, when the wind always veers to south and south by east, there is a considerable sea. The shore is skirted by rocks some distance off and the bay is quite unfit for anchorage. The land is of the same height as about Sea Bear Bay but has more lumps of rocky hills visible on its outline.

**Shag Rock,** a whitish mass of bare rock, lies about 1½ miles off Hilly Point. At 2 miles southward of it are four small, dark-colored rocks, and a mile farther rather a large rocky islet.

The highest and most conspicuous hill in Spring Bay is 7 miles northwestward of Hilly Point. It shows as a good mark in all directions.

**Sirius Shoal.**—Off Spiring Bay, a rock named Sirius Shoal (the Eddystone Rock of old charts) is retained on the charts, although its

existence is doubtful. It would seem that this rock and Bellaco Rocks, mentioned hereafter, are the same danger, but the whole coast between Cape Blanco and Port San Julian is much strewn with shoals, which are the more dangerous from the strong tidal streams setting between them. The ship *Sirius* (1849) is said to have run on a reef of rocks about 10 miles east-northeast from the southern point of Spiring Bay. The position of the reef was given as about latitude 48° 7′ south, longitude 65° 37′ west.

In directing the ship's course by night near this coast regard should be paid to the tidal streams, which set with considerable strength parallel with the shore. As a general rule, there exists no known danger when the depth is more than 40 fathoms.

**Desvelos Bay.**—At 22 mile ssouthwestward of Shag Rock is Cape Watchman, a low point, the southern extremity of Desvelos Bay; about 6 miles northward of the cape and 1 mile offshore in a 3-fathom shoal, marked by kelp. There are also many other shoal patches, usually marked by seaweed, with depths of 7 to 9 fathoms between them.

The ground is foul and uneven for about 5 miles off Cape Watchman, causing heavy tide rips. It is advisable to give the cape a wide berth and pass eastward of Bellaco Rocks. Northward of the cape will be seen Montevideo, somewhat resembling El Cerro at Montevideo, both in shape and color, but not quite so high.

Desvelos Bay offers good shelter from westerly winds; due allowance must be made for the tidal streams which sweep along the shore at rates of 2 to 3 knots an hour.

**Bellaco Rocks,** also called San Estevan Bank, 10½ miles 140° from Cape Watchman, consist of two rocks awash at high water, with kelp growing on most parts. The larger or eastern rock is about 100 yards long and 80 yards wide. Within ½ mile of the south side of these rocks are depths of 12 to 15 fathoms, rocky bottom, and on the east side, at the same distance, 20 to 24 fathoms. Bellaco Rocks, at low water, should be seen in clear weather at some distance, as the rise and fall is 20 feet.

**Laura Bay.**—The coast southward of Cape Watchman forms a bight, in the southwestern part of which is situated Laura Bay.

Cape Mercedes, the southern point of this bay, has a remarkable flat-topped rock on its summit, and may be safely approached, as the off-lying rocks are close-to and always visible.

Isabel Point, the northern point of the bay, has rocks extending ½ mile southeastward from it. Temporary anchorage in 4½ fathoms may be found eastward of Cape Mercedes, and in the same depth northwestward of that cape, but the holding ground is bad.

**Shoal.**—A shoal on which the sea breaks is reported to lie about 27 miles 177° from Cape Watchman.

**Lookout Point—Foul ground.**—From Cape Mercedes, 4 miles southward of Cape Watchman to Lookout Point the land increases in height and the coast is safer; but 5 miles eastward of the point there is a large patch of foul ground with much kelp. In advancing southward the land still rises till it attains a height of over 600 feet, and is then remarkable for its horizontal outline. Flat and Bird Islets, 11 miles southward of Lookout Point, though low, are too near the land to be dangerous to vessels that keep a fair offing.

**Dañoso Reef.**—At 9 miles southward of Flat Islet and off the high table-land of Cape Dañoso, a dangerous reef projects 3 miles southeastward from the shore, but does not appear to be steep-to; thence to Port San Julian there is no known danger.

**Port San Julian** is 75 miles southwest of Cape Watchman. Mount Wood, 951 feet high, and visible about 35 miles, is a good mark for the port, being flat-topped and much higher than the land about it. The trend of the coast may also be useful as a guide and as the land about the port is higher than on either side no mistake can be made.

Cape Curioso, the north point of entrance, is a low point jutting northward, formed of stratified cliffs, the upper part white brown and the lower black or with black streaks. Desengaño Point on the south side of entrance may be distinguished at 6 or 7 miles in clear weather. A spit extends about ¾ mile north-northeast from the point.

**Bar.**—A bar crosses the entrance and forms in the middle an extensive bank, just covered at high water, leaving a rather intricate channel on either side. The great range of tide makes the passage over the bar comparatively easy by previously observing the position of the banks at low water, but great attention should be paid to the set of the tidal streams, which run sometimes at the rate of 4 knots an hour.

**Supplies.**—No fresh water appears to exist in any part of this inlet, its upper part being a chain of salt lagoons, but wood may be procured on Shag Island and at other places. Sea fowl and fish are plentiful.

**Anchorage.**—Should the tide not serve for entering, anchorage may be obtained in 8 or 9 fathoms water a good mile northeast of Desengaño Point until a proper opportunity offers, but if the wind be southeast or the weather threatening it would be prudent to stand off and on. The most convenient anchorage inside is in 4 fathoms water off Sholl Point. In 1890 a small monument erected to the memory of Lieut. Sholl was standing close to this point.

**Directions.**—The best time to enter is about three-quarters flood, when a vessel will probably have depth enough on the bar, and the

parts that dry at low water will still be visible. In 1875 the southern channel seemed the more intricate, and several small patches were seen in it. In the north channel, in the track taken by the British vessel *Rocket*, 19 feet at high water was the least depth obtained.

**Communication.**—There is regular steamer communication monthly with Punta Arenas. Communication with the La Plata is by the Government steamer, calling here monthly, and by two steamers of the Hamburg-South American Co. There is telegraphic communication with Buenos Aires and Punta Arenas, Magellan Strait.

**Tides.**—High water, full and change, at Port San Julian is at 10h. 45m.; springs rise 30 feet, neaps 23 feet; neaps range 16 feet.

**Tidal streams.**—The tidal streams in the offing turn about 3 hours after high and low water.

**Coast.**—Southward of Port San Julian the coast is low, covered by scrubby bushes, and fronted by a shingle beach. At 10 or 12 miles south of the port a small flat hill is seen over the low coast hills.

In latitude about 49° 29′ south the character of the coast changes with a range of steep white clay cliffs, the average height about 315 feet; they rise like a wall from the sea, which at high water nearly washes their base, but at low water leaves in their front a considerable extent of shingle and mud beach. Some short rocky ledges, which break at half tide, lie off several parts of this range, but none of them extends more than a mile from the shore.

**Anchorages.**—Anchorages along the coast may be taken up with the wind off shore, at 1 to 2 miles from the beach, in 9 to 14 fathoms water, oozy bottom. In latitude 49° 58′ south the range of steep white cliffs begins gradually to diminish in height, and 9 miles farther southward terminates in North Point, 180 feet high, on the north side of entrance to Santa Cruz River.

**Puerto Santa Cruz.**—The estuary of this name, about 16 miles long northwest and southeast, is formed by the junction of the Rivers Santa Cruz and Chico. At the entrance the width is about 1 mile, increasing inside to 3 or 4 miles.

Santa Cruz is of importance in being the only place on the east coast of Patagonia accessible to large vessels. Light craft can navigate to Pavon (Pabon) Island, 15 miles above Weddell Bluff, but the channels are intricate.

The coast about the entrance of this river is remarkable and easily recognized. From the southward as far as the eye can reach extends a coast line of cliffs and downs of considerable height, terminating abruptly in Mount Entrada, a high, steep, flat-topped cliff, 361 feet high, the south entrance point of the river; the land on the northern side of the river is low.

Leones Island (Sea Lion Island), 5 miles within the entrance, lies in the middle of the river, here 3 miles wide, on a triangular bank of

mud, sand, and stones, which dries in places extending from Quilla Point to Reparo Point; Largo Bank, a long, narrow strip of similar formation, lies ¾ mile eastward of the island, and narrows to ½ mile the channel of the river between it and the eastern shore.

Weddell Bluff, on the south bank, 12 miles up the river, is a conspicuous headland 300 feet high; on the opposite shore, 6 miles beyond, is Beagle Bluff.

**Northern arm.**—At Weddell Bluff the river divides into two arms. The northern, which passes under the east fall of Beagle Bluff, was examined by Capt. Stokes for 12 miles up, where it ceased to be navigable even at high water. Its bed was divided by banks of sand into several little fordable streams, preserving, as far as the inequalities of the land permitted the eye to follow their course, a mean north-northwest direction. The stream was here quite fresh, but still subject to the regular ebb and flow.

The shore on the southwest-southwest side of this arm is a range of clay cliffs 250 feet in average height, with grassy downs intersected by valleys and ravines. On the eastern side the land for the most part is low and level, with a shingle beach; the aspect of the country is dreary and the vegetation scanty. Many brant geese and ducks were seen, as well as the common sea fowl of these parts; several ostriches also made their appearance on the beach, and traces of guanacos were observed.

**Western arm,** which is far the more considerable of the two, was examined for 33 miles. From Beagle Bluff it trends westward 6 miles, with a mean width of 2½ miles. At 4½ miles up the influence of the tides had altogether ceased and the water was quite fresh. The stream ran clean and pure, with a velocity of at least 5 knots an hour over a bed of pebbles mixed with dark sand, its mean width being ¾ mile and depth in midchannel 8 feet. It runs between two nearly parallel ranges of hills about 4 miles asunder. Beyond this the reaches are short, seldom more than 2 miles long, and form tortuous courses.

Capt. Fitz-Roy undertook an expedition up the river with three light whaleboats; they labored by rowing or tracking for 16 days, when, their provisions falling short, they were obliged to abandon this interesting exploration and return to the ship, where they arrived in four days. The utmost point they reached was 140 miles in a direct line westward of the entrance, or 245 by the course of the river; they were then within 30 miles of the foot of the snow-capped Andes.

**Settlement.**—At ½ mile below Weddell Bluff is the town of Santa Cruz, with a population of about 800, where a small party of seamen, under the charge of an officer, is stationed by the Argentine

Government, affording shelter and food to shipwrecked seamen. There are also a number of settlers farther up the river.

**Supplies.**—Guanacos are plentiful and good eating, and the flocks and herds are rapidly increasing in the interior. Fresh meat may be obtained. Fresh water may be procured at the watering place at the settlement; above Weddell Bluff the water is fresh during the last half of the ebb. Firewood is obtainable.

A colonist is living with his family on Pavon Island, 15 miles above the settlement, and there are a few dwellings between.

**Communication.**—Santa Cruz has regular monthly steamer communication with the surrounding places and with Buenos Aires and Punta Arenas. The steamship lines touching here are the Argentine steamers of the Nicolas *Mihanovich*, Hamburg-South American, and Piagio, and the Chilean lines of Menendez, and Brown and Blanchart, of Punta Arenas. It is also connected with Punta Arenas by a road.

**Bar.**—At 4 to 5 miles seaward of the entrance points is the bar, which, stretching southward about 7 miles from the north shore, is an accumulation of mud and gravel, with shoal patches in places, of which some dry at low water, about 6 feet, and others are denoted by breakers.

The depths at low water in the three channels are: North Pass, 13½ feet; Central Pass, 11 feet; South Pass, 16 feet.

**Volage Bank,** which breaks at low water lies nearly 2 miles outside the bar, with Mount Entrada bearing 319°, distant 5.8 miles.

**Nuevo Shoal.**—Nuevo Shoal, located in North Pass, entrance to Santa Cruz River, with a least depth of 7 feet at low water, has shifted about 218 yards 290° 30′ from its former position and now covers an area included between the bearings of 138° and 142° and the arcs of two circles having radii of 2.25 miles and 2.4 miles, respectively, from the lower front beacon of South Pass, as a center. A small shoal with a least depth of 8 feet at low water has formed 5,300 yards 136° 30′ from the above front beacon. A large shoal has formed and covers an area between the bearings 147° and 149° 30′ and the arcs of two circles having radii of 2.55 miles and 2.7 miles, respectively, from the above front beacon as a center. Between this shoal and Nuevo Shoal is a channel 600 yards wide carrying a least depth of 11 feet at low water. The present range 285° cuts this shoal 98 yards within its northern limit, and vessels entering the North Pass must keep the range open a little to the northward.

**Beacons and ranges.**—A beacon on the spit extending off Entrada Point is painted white with a red horizontal band 4 feet wide in the middle and another, or rear beacon, bearing 285°, distant 1.7

miles from front beacon is painted black. These beacons in line lead through North Pass.

South Pass lower or front beacon located about 2 miles eastward of Cascajo (Shingle) Point is painted white and red horizontal bands with red top; the upper or rear beacon, located 800 yards 26° from the front beacon, is painted red. The beacons in line lead through South Pass.

Weddell Bluff, midway between Entrada and Cascajo Points bearing 318° 30′ lead through Central Pass.

Two beacons on Ojos Point, in line of bearing 116° 30′ lead between the shoals northward of Leones Island.

**Anchorage.**—The anchorage, on the south side of the river, about 2 miles within the entrance, is about ¾ mile east of Quilla Point, in 10 to 11 fathoms water, or 600 yards southeast of this in 8 to 9 fathoms, with the higher entrance beacon bearing 219°, distant 1,200 yards.

A good berth will also be found, in 5 or 6 fathoms water, above Leones Island and near the shore off Raparo Point, where there are some houses, but strangers should first anchor east of Quilla Point, so that an ebb tide may expose to view the shoals that surround Leones Island. It is advisable to moor.

Violent squalls, but of short duration, have been experienced in the month of December. With a fresh breeze blowing against the strong streams in the river, boating is somewhat dangerous.

The sloping shingle beach at Quilla Point, 3 miles within the entrance, where the *Beagle* was placed on the shore in 1834, offers a most convenient spot for beaching a vessel, and the great range of the tide (which must be considered when anchoring) and the clean shore render Port Santa Cruz a most desirable place for the operation.

**Directions.**—The approach to Port Santa Cruz in clear, dry weather is easy. The appearance of the land varies according as one comes from the north or the south, but in no case can the entrance be mistaken, as it is the only opening in the high coast between Port San Julian and Coy Inlet. If one has before him high land gradually sloping to the sea, he is southward of the entrance; if a long, unbroken line of white and not very high cliffs, he is to the northward.

From the north, steering at a distance of a few miles along the cliffs of gradually diminishing height between Cape Francisco de Paulo and North Point, one sees first at about 20 miles from the mouth of the river a high mountain with flat summit, Mount Jaures, which appears to continue to the right and left in step-like side slopes. When in the latitude of North Point the very low coast

which forms the continuation of North Point is distinguished, and beyond it a row of elevations, whose perfectly horizontal ridges fall in steps. Thereupon appears Mount Entrada, 361 feet high, of steep, conical form, with flattened summit, which on a nearer approach, when the higher mountains behind it gradually vanish, takes on the appearance of a promontory. To the right of Mount Entrada is seen a row of white cliffs ending in Weddell Point; to the left are elevations less regular; the far visible Mount Jaures, in whose neighborhood on the coast is seen the remarkable Pico Quebrado, dominates all; a little farther to the left is seen on the horizon the isolated conical Mount Leon.

From the south Mount Entrada has the appearance of a cape falling almost perpendicularly into the sea, the northern limit of a line of high cliffs. To the left these cliffs continue as far as the eye can see in a horizontal plateau over which rise a few flattened summits. The sugar-loaf form of Mount Entrada first appears after passing its longitude.

In approaching the entrance, especially if from the southward, the Volage Bank must be avoided. It lies 5.8 miles southeastward of Mount Entrada, and is known by the breakers.

**North Pass,** between the north shore and the dry banks of the bar, is considered both safest and easiest.

Mount Entrada may be approached bearing about 282° until Entrada Point beacons are in line bearing 285°, which range will lead over the bar in the best channel. When Weddell Bluff is in line with the north point of Leones Island bearing 319° the bar is crossed, and vessels may steer as necessary along the south shore for the anchorage.

**Central Pass.**—To enter the river by this pass the bar should be crossed with Weddell Bluff seen midway between Entrada and Cascajo Points bearing 319°.

**South Pass** is not recommended when entering the port, as the turn into the river is very sharp.

The two beacons situated eastward of Cascajo Point in line bearing 26° lead through this channel.

After passing the bar the channel, about a mile wide, lies along the edge of the reef, here about 1½ miles offshore, to avoid which the high beacon should not be opened west of the low beacon. When the leading marks for the Central Pass come on a vessel may steer to pass midway between the points of entrance and along the south shore to the anchorage.

**Caution.**—With rapid tidal streams and frequent heavy seas a bar of sand and shingle stretching across the mouth of a large river is not likely to long retain its position. Strangers are therefore advised to remain outside the bar, either at anchor in a depth of about 8 fathoms

or under sail, until low water, when the shallow parts show themselves, and to weigh at half or two-thirds flood, as the tide rises very high, and steer directly in through the most convenient of the channels.

**Tides.**—High water, full and change, on the bar is at 9h. 30m.; at Quilla Point, within the River Santa Cruz, at 9h. 58m., and at Missioneros at 10h. 17m.; at the mouth springs rise 35½ feet, neaps 26½ feet. Outside the bar the water rises during 5½ hours and falls 6 hours. In the first 3 hours occurs seven-tenths of the rise or the fall.

**Tidal streams.**—The tidal streams have velocities of 3 to 6 knots an hour, according to the tide and the width of the channel, and follow the direction of the fairway; in the offing they run regularly 6 hours each day, but turn 2 hours later than the time of high water inshore. The flood sets east-northeast and the ebb west-southwest.

**Coast.**—Between Santa Cruz and Coy Inlet, 58 miles to the southward, the coast forms a considerable bight and consists of a succession of cliffs and low beaches. It is fronted by a ledge of rocks, which at half tide are either dry or shown by a line of breakers; they extend in some places 3 miles from the shore. This coast, which affords neither fuel nor water, should not be approached within 5 miles.

From Coy Inlet to Cape Fairweather the coast is similar to that northward of the inlet, but freer from rocky ledges, and good anchorage may be obtained 2 to 6 miles offshore, in depths of 7 to 14 fathoms mud, the water shoaling gradually to the shore. The beach is of shingle to high-water mark, and then of hard clay to just beyond the low-water limit, where a green muddy bottom begins. The outer edge of the clay is bounded by a ledge of rocks on which the sea breaks, which extends for some distance parallel with the coast.

**Coy Inlet** is conspicuous, as it is the only part of the coast that has the appearance of an inlet between Santa Cruz and Cape Fairweather.

It is said to be a shoal basin, 19 miles long and some miles wide at high water, fronted by a bar of rocks with a passage of 6 feet water; inside there are places with 1 to 3 fathoms water, but in most parts of the inlet the banks are dry at low tide. The inlet is cliffy on the southern side and at its head receives the drains of an extensive flat country.

**Tides.**—High water, full and change, in Coy Inlet is at about 9h. 30m.; springs rise 40 feet.

**Cape Fairweather** is the southern extremity of the long range of clay cliffs, 300 to 400 feet high, that extends from Coy Inlet. The interior is formed by open plains of undulating country, covered

with grass and plants, but entirely destitute of trees; it abounds with guanacos.

From a distance, with the low land to the southward below the horizon, the cape has been mistaken for Cape Virgins, at the entrance of Magellan Strait, notwithstanding the difference of more than 45 miles in the latitude of the two headlands. In fine weather the Friars and other hills will assist in identifying the coast; in thick weather the bottom will be of service, being of mud off Cape Fairweather and of gravel and coarse sand off Cape Virgins.

**Water.**—About 17 miles north of Cape Fairweather there is a ravine where water may be obtained when the wind is offshore; it is much grown over with plants, and the water may not keep, but will give a temporary supply. Fresh water may also be seen trickling down the face of the cliffs at short intervals.

**Port Gallegos.**—The entrance to Gallegos River is formed on the north by the cliffy land of Cape Fairweather and on the south by a low shore that is not visible from seaward more than 10 or 15 miles, excepting the hills in the interior named the Friars, the Convents, and North Hill.

The mouth of the river is fronted by extensive sand banks extending about 7 miles offshore, most of which may be crossed at high water, though at half ebb many are dry; others never dry, but are easily distinguished by the breakers upon them. The entrance is southward and westward of these banks, and parallel with the shore south of Loyola Point.

The settlement on the south bank of Gallegos River, 10 miles from its mouth, consists mostly of small wooden houses, and the settlers, are engaged in raising cattle and sheep; the wool, for which it is a depot, is shipped by small vessels which lie on the beach for the purpose; there is a small pier. The climate is dry and invigorating.

**Communication** with the La Plata and the Patagonian Harbors to the northward is by the Government steamer, and steamers of the Hamburg-South American Co. With Punta Arenas there is regular steamer communication every 14 days. From the settlement to Punta Arenas there is an easy track, available for wheeled vehicles, the journey occupying about 3 days. There is a telegraph station.

**Trade.**—Gallegos is a free port. The exports consist of wool and sheepskins. The imports are principally coal, sheep dip, fencing wire, galvanized iron sheeting, provisions, etc.

The land near the port is only suitable for sheep farming. A large number of the farmers and shepherds are of British nationality. The population is about 600.

**Anchorages.**—A vessel should anchor about 2 miles offshore, with Cape Fairweather about 350° and observe the channel and banks

at low water before entering. This anchorage is good and sheltered from the prevailing winds.

Anchorage inside may be taken up on the south side near Loyola Point; to the northward the banks are extensive.

The anchorage off the settlement, in from 3¼ to 3¾ fathoms of water, loose shingle, is between the pier and an extensive shoal in the middle of the river, and care is necessary to avoid this shoal, as it dries at about three-quarters ebb. Vessels should moor, open hawse to northwest, and be prepared for dragging, as the holding ground at this anchorage is bad. The British man-of-war *Basilisk* moored on the north side of the shoal during neaps, but at springs there would not be sufficient water.

**Caution.**—The banks at the entrance of this port have changed considerably since the survey made by Capt. Stokes in 1828. The British man-of-war *Beagle* visited the port in 1898 and found that the plan could not be relied on either as regards the depths or the relative positions of the different points between the bar and the settlement; also that between Loyola Point and the settlement the soundings were less than shown on the chart.

**Directions.**—Approaching Port Gallegos, keep the North Convent in line with South Friars until the south extreme of Cape Fairweather bears 340°, then steer toward the cape and anchor to examine and ascertain the position of the shoals at the entrance; only vessels of light draft should attempt to go inside.

Half flood is the best time for entering and leaving Port Gallegos.

**Tides.**—High water, full and change, in the entrance of Port Gallegos is at 8h. 50m.; springs rise 46 feet.

**Tidal streams** sometimes run 5 knots an hour.

**Coast.**—From Port Gallegos to Cape Virgins the coast trends southeastward, and for the first half of the distance is formed by a low shelving shore, invisible at a few leagues seaward.

At 18 miles southward of Cape Fairweather the cliffs again begin, and continue thence to Cape Virgins with only one or two breaks, in one of which, 8 miles north of the latter cape, a boat might land if necessary. There is good anchorage along the whole coast between Port Gallegos and Cape Virgins, at 2 to 5 miles from the shore, but the bottom is rather stony.

**Condor Cliff anchorage.**—Should a vessel from the northward find the wind so strong as to prevent her entering the strait, an anchorage quite sheltered from winds between south and northwest will be found in 8 or 9 fathoms at 1¾ miles from the shore, with Cape Virgins bearing 196° and Condor Cliff 264°.

The German war vessel *Vineta*, bound from Montevideo to Valparaiso, anchored here in January, 1880, on account of strong and

increasing west-southwest wind, with Cape Virgins bearing 204°, distant 3½ miles, in 13½ fathoms water. Capt. Zirzow recommends the anchorage as especially well protected from southwest and west winds. The strongest current here observed was 1½ miles to the west-northwest.

**Cape Virgins.**—See Chapter VII.

**Tidal streams.**—Along that dreary and almost unbroken coast extending from Cape Corrientes to Bahia Blanca the stream of the tide is very weak, although the water rises and falls about 10 feet. The great tidal wave from the southward here appears to end, after sweeping along the southern half of South America.

In the depth of the Gulf of San Matias there is very little stream of tide, but a rise and fall of 20 to 30 feet.

In the Gulf of St. George there is not much stream of tide. Off Capes Dos Bahias and Blanco, especially the latter, the tidal streams are again strong, and the races off Cape Blanco are almost as dangerous as those off the Peninsula of San Jose.

In navigating this coast the mariner should bear in mind that there is a difference generally of half a tide between the turn of the tides in the offing and high or low water in the harbors and along the shore, the turn of the stream in the offing being 3 hours later than the corresponding turn of the tide inshore. In other words, the northern or flood stream runs in the offing 3 hours after the tide has begun to ebb on the shore, and conversely.

Outside the Sarmiento Bank the flood stream sets northwest along the coast and the ebb southeast. At the south end of the bank the flood divides, one part running into the strait, while the other continues northward along the northern edge of the bank. The ebb stream coming out of the strait is turned to the southward by the tide sweeping across the entrance to the southwest. Throughout the eastern entrance to the strait there are two regular tides in the 24 hours, but to the seaman the point of greatest importance is that the west and east or flood and ebb streams continue running in the channel for 3 hours after high and low water by the shore, and as this time becomes later as we proceed to the westward it follows that by starting from Dungeness or Possession Bay at the proper time of tide, a vessel may get well up to First Narrows by the last of the ebb, so as to take advantage of the flood stream as soon as it makes, and enjoying its full effect, may thus get to Royal Road or Sandy Point in one day, unless the wind is very strong against her.

**Tidal races.**—Off the Peninsula of San Jose there are dangerous tidal races, and so high and so violent are the waves at particular times of tide that a small vessel might be most seriously injured if not totally destroyed by getting into them.

Lieuts. Wickham and Stokes, of the British Navy, while surveying this part of the coast in two small craft, one of 9 and the other of 13 tons burden, were drawn during a calm within a mile of one of these races while it was roaring and boiling furiously. To anchor was impossible, for no bottom could be found with the deep-sea lead, and they were fast approaching the fatal race when, fortunately, a breeze sprung up, enabling them to stem the stream, and after a struggle with oars and sails, at last to overcome the tide and avoid the danger.

Near the entrance of the Bay of San Jose the races are violent at times, but not so dangerous as those on the east side of the peninsula.

In the archipelago of Tierra del Fuego the flood stream comes from the northwest, passes round Cape Horn, through the strait of Le Maire, and then (from Cape St. John, sets strongly to the eastward and northeastward. From thence the flood runs to the northeast) along the north side of Staten Island and Tierra del Fuego, causing very high tides at the entrance of Magellan Strait, where it unites with the stream which has come directly through the strait, and, passing onward along the coast of Patagonia, produces high water at each place in succession until it is lost near Cape Corrientes.

Near the coast between the dangerous banks of San Blas and Bahia Blanca the flood and ebb streams set nearly north and south 1 to 4 knots an hour, according to the wind and the age of the moon. Between the banks of San Blas and the Rio Negro the tidal streams are regular, running a little more than six hours each way, if not affected by the wind, with velocities of 2 to 5 knots an hour. These strong and dangerous tidal streams are not much felt at 15 miles from the land. Between San Blas and Cape Bermeja the tidal streams set northeast and southwest, about equally strong each way.

# CHAPTER IV.

## THE FALKLAND ISLANDS.

### EAST FALKLAND.

**Making the land.**—Vessels approaching the Falkland Islands from the northward should endeavor to obtain soundings off Cape Corrientes, in about latitude 39° south, thus verifying the longitude; for the edge of the bank is so steep that in 10 miles the depth changes from no bottom at 100 fathoms, to 60 fathoms, sand; by sounding every 2 or 3 miles until on the edge of the bank in about 80 or 90 fathoms, the longitude may be obtained within a very few miles. In latitude 39° south the edge of the bank is approximately in longitude 56° west; in latitude 41°, in longitude 56° 55′; and in latitude 45°, in longitude 59° 30′.

Should a sailing vessel be unable to close the coast so as to strike the edge of the banks as far north as latitude 39° south, she should endeavor to do so as soon afterwards as possible, taking advantage of every northerly and northwesterly wind to steer about southwest, in order to make up for being driven to the southeast when the wind draws to the southwest, which it does at least every second or third day.

By persevering in getting to the southwest whenever the wind permits, until westward of longitude 60° west, the danger of being driven to the northeast of the islands will be avoided; whereas, if a vessel make a straight course for the islands when the wind is fair, she will almost certainly be driven to leeward by the frequent southwesterly winds and find great difficulty in again getting to windward.

Having, if possible, kept as far to the westward as longitude 60° west, until in latitude 49° 30′ south, soundings will be obtained on the bank to the northward of the Falklands, in depths of about 80 to 85 fathoms, over fine dark sand.

If the longitude can be depended on, a course may then be steered to make the land about 20 miles westward of Volunteer Point at the entrance to Berkeley Sound; but if the position of the vessel be doubtful, or the wind draw round from northwest toward

southwest, it would be better to keep to windward, so as to make the Eddystone Rock.

This rock, 260 feet high, should be seen, with a clear horizon, in the darkest night before a ship would be in danger, as there is deep water close round it; but if any doubt exist regarding the longitude it would be prudent, during the night, not to run on after shoaling to 50 fathoms, should the wind be toward the shore, as a vessel might pass the Eddystone and become embayed in the deep bight westward of it.

The same rule naturally applies in thick weather, which always accompanies northerly and northeast winds; but if the position has been ascertained by observations shortly before darkness or thick weather has set in, a vessel may run for the northeast point of the island with confidence; and if the land be not seen about Macbride Head or Cape Carysfort when the water has shoaled to 40 fathoms, it will then be necessary to head offshore until daylight, or until a break in the thick weather enable the land to be seen. Thick weather seldom occurs, and it is not often that the land can not be seen at 20 miles.

In coming from the northward the most eastern hills seen are those immediately over Berkeley Sound. The first appearance of the land is very unfavorable; rugged hills, the summits of which are stony and very light colored, have made many suppose that the high land is always covered with snow; but this is rarely the case from October till April or May, except patches in the hollows of the mountains which sometimes remain till November.

A rock was reported by the *Eagle* (1817) in latitude 51° 51′ south, longitude 64° 30′ west; this position was examined by *Fitzroy* and others, without finding any trace of its existence, and the report has therefore been attributed to floating ice with débris. The French vessel *Courier du Pacifique* (1884) reported a rock in latitude 52° 10′ south, longitude 64° 37′ west, which is also attributed to floating ice. The chart shows L'Aigle Reef marked "P. D.," in this latter position. Care should be exercised in this locality.

Coming from the southward, in thick weather or at night, the lead will not be much guide, as Beauchene Island is on the southern edge of the bank which surrounds the Falkland Islands; and the 100-fathom curve only extends about 5 miles southward of it. After passing eastward of Beauchene, a 38° course for 60 miles will clear all the islands off the southeast coast of East Falkland, making due allowance for the current, and the depths then should be from 60 to 70 fathoms, about 15 miles southeast of Lively Island.

If in daylight, and the weather be clear, the high land in the central chain should be seen from a considerable distance, and a course may be steered near the coast, passing about 6 or 7 miles

outside the eastern Sea Lion Island, and the same distance from Shag Rock (which shows high out of the water), and from Lively Island. In either case, after passing Lively Island, a course should be steered toward the easternmost of the hills; if thick, or too dark to see the hills, a vessel will be a very good position for waiting for daylight and should endeavor to keep the depths of from 40 to 50 fathoms.

There is a current setting to the northeast, probably part of the Cape Horn drift, which has been found 500 miles from these islands, seaweed, driftwood, and a rippling of the water strongly marking its existence.

Off the Falklands penguins may be seen and heard 300 miles from the land; they need not, therefore, cause any alarm; one sign, well worth noting, however, is the presence of the cormorant, which is rarely seen more than 10 miles off the land.

**Caution.**—During and after long-continued southeasterly gales, when a heavy sea rolls in on the south and southeast coasts of the Falkland Islands, there is stated to be a strong set to the northwestward, to which set has been attributed the loss of several vessels in the neighborhood of Bull Point. Vessels from Cape Horn, intending to sight Beauchene Island should therefore make due allowance against a possible set of 20 to 30 miles a day to the northwestward.

**East Falkland Island.—Cape Dolphin** is a long, low, narrow strip of land, jutting out from the northwest part of East Falkland; a shoal about ¾ mile to the southwest is marked by kelp. With northerly winds a heavy sea prevails all along the coast from Cape Carysfort to Cape Dolphin, and between the latter cape and the Eddystone Rock there runs a turbulent race, which would often be fatal to very small vessels.

**Eddystone Rock,** 4 miles northwest of Cape Dolphin, is 260 feet high, and steep-to in all directions; at about 8 miles it resembles a ship under sail.

**Cape Bougainville** bears 98° distant 19 miles from Cape Dolphin; between them the coast is slightly indented, and an indraft has been observed. The depth at 4 miles is 40 to 45 fathoms, fine greenish-colored sand with small black specks, gradually decreasing to 12 fathoms close to the shore. At 4 miles westward of Cape Bougainville is Lion Point, westward of which a cluster of rocks extends 1½ miles, with 10 fathoms water at 200 yards to the northward.

The coast about Cape Bougainville was reported (1900) to lie further southward than charted.

**Port Salvador,** 9 miles eastward of Cape Bougainville, is a spacious and magnificent port, but difficult to enter owing to the narrow channel and the rapidity of the tidal streams, which sweep the

kelp under water and cause violent races in many parts of the passage; the water is deep and the bottom hard, and consequently it is doubtful whether an anchor would hold, if found necessary to let one go.

The narrow passage to the port is 7 miles long between Hut and Platt Points; the port is more difficult to enter than to quit, as the wind generally blows outward; for a sailing vessel to enter, a good commanding breeze is absolutely necessary.

**Caution** should be used in passing the entrance of Port Salvador, as the tidal stream rushes in strongly, and the reefs on either side, which extend a good mile offshore, would be dangerous if a vessel should get embayed in bad weather.

**Directions.**—The best time to enter Port Salvador is at low water or the early flood; and to leave, the last quarter ebb. The usual passage in, with a fair wind, is westward of Center Island. In working in, after passing well to the southward of Mid Rock, it is advisable to cross over between it and the island and work up on the eastern side, as the water is not so deep nor the stream so strong as on the other side of the island.

After passing Center Island there is more working room; anchorage for one vessel may be found at the mouth of the lagoon on the west side, in 7 fathoms water, good bottom; but it shoals suddenly to 2 and 3 fathoms. Having cleared the entrance channel, good and secure anchorage is found all over the port. The dangers are nearly all visible, and the strength of the tidal streams is trifling everywhere except in the channel and between some of the islands, where they seldom exceed 1½ or 2 knots an hour. The coves and creeks abound with fish, and the shore with cattle, rabbits, and wild fowl, heath fuel, and good water.

**Tides.**—High water, full and change, in the lagoon at the entrance is at 8h. 10m.; springs rise 8 feet, and in the port 5 feet.

**Tidal stream.**—The ebb stream in the entrance runs at the rate of 6 knots an hour.

**Cape Carysfort.**—Macbride Head is about 11 miles eastward of Port Salvador, and Cape Carysfort, 150 feet high, is 6 miles beyond. Both these capes are cliffy, and a projecting point between them has small detached rocks off it, which show plainly in passing along the land. Cape Carysfort may be passed at a mile, and the low land and rocky islets forming Volunteer Point will then be distinctly seen.

**Cow Bay,** lying close southward of Cape Carysfort, affords clean, sandy anchorage in depths of 7 or 8 fathoms, open to the eastward, and is easily known by its white sandy beach and the bluff land about the cape; toward dark vessels bound to Stanley might find it convenient to drop an anchor here for the night.

**Uranie Rock** lies 1 mile 104° from the rocky islets off Volunteer Point; a berth of 2 miles should therefore be given to the islets in order to clear this rock. It is the more dangerous as with westerly winds the sea seldom breaks on it, and it is not marked by kelp.

By keeping Cape Carysfort to the westward of 304° until Mount Low bears 228° or at night Cape Pembroke Light bearing 194°, a vessel will pass nearly 2 miles outside of it and may then haul up for Mount Low, the easternmost high hill on the island. The hill may be easily seen, on a clear night, when to the northward of Volunteer Point; the summit, 840 feet high, forms two peaks, and from the eastern one the land slopes down to the point that divides Berkeley Sound from Port William.

**Berkeley Sound.**—The entrance to this capacious sound opens out directly after passing Volunteer Point and can not be mistaken. It is 4½ miles wide at the entrance, between Eagle Point on the north, Kidney Island on the south, and 16 miles long, terminating in the three excellent anchorages, Johnson Harbor, Stag Road, and Port Louis.

After passing Eagle Point, from which a reef extends for about ½ mile, the sound is clear of all danger up to Sea Lion Rocks, which appear at a distance like two or three small boats; vessels bound to either of the above-mentioned three anchorages should first steer for these rocks, the dangers round which are well marked by kelp.

Berkeley Sound may be entered by night, if the entrance be made out before dark, and may even be worked into safety until nearly abreast of Johnson Harbor, where a vessel can anchor in 12 to 15 fathoms outside the kelp patches off Long Island, but rather to the southward of mid-channel, to avoid getting too close to Sea Lion Rocks, which can not be seen on a dark night.

**Johnson Harbor,** in the northwest corner of Berkeley Sound, is ⅔ mile wide at the entrance, from kelp to kelp, which shoots up here in 5 or 6 fathoms and marks well the limits of the channel. Off Lamarche Point the kelp will be seen to extend a long distance, with another large patch opposite to it, together narrowing the passage to ⅓ mile. After clearing these the vessel may boldly proceed up the harbor and anchor off Magellan Cove in 5 to 6 fathoms, mud.

**Water.**—The watering place is at the northwest corner of Magellan Cove, but is inconvenient, as the beach shelves out a long way. If not in want of water, a better berth may be found farther westward, with shelter from heavy southwest and southerly gales, which raise a heavy sea off Magellan Cove. The landing on the western shore is also more sheltered.

**Settlement.**—There is a small settlement on the northeast side of Chabot Creek.

**Stag Road** offers, off Bougainville Creek, a still better anchorage for large vessels. The two large kelp patches may be passed close-to, and a large vessel may work in and anchor in any part of the road in depths of 4½ to 6 fathoms. The best berth will be found in mid-channel between Hog Island and the north shore, but this is 2 miles from the watering place, which is westward of the Carenage.

**Port Louis,** at the western end of Berkeley Sound, has its main entrance between Long Island on the south and Peat Islet and Hog Island on the north. A rocky patch nearly in mid-channel contracts the passage to a width of little more than 200 yards. After passing this patch keep to the northward of Round Island.

This anchorage is nearly landlocked. The most convenient berths for small vessels are off the Carenage, in 3 fathoms, about ¼ mile from the shore or farther southward in 3½ or 4 fathoms.

The Carenage, at its entrance, scarcely more than 100 yards wide, expands within to a sheet of water almost circular in form and nearly ½ mile wide. From the shoalness of the water, however, it is adapted only to boats.

**Settlements.**—The old settlement was on its western side, but a new settlement is said to be forming in the southwest part of the port, where, in 1897, there was a dwelling and large storehouse and also a quarry from which good stone for building purposes was obtained. There is a large woolshed on the east side of the passage leading to the Carenage and a small settlement on the south shore of Port Louis, about a mile west of Lerat Point at the entrance of Duperry Harbor.

**Observation spot.**—The stone marking the spot where magnetic observations were made by the *Erebus* and *Terror* in 1842, and *Challenger* in 1876, also the tablets on the seashore recording the observations on sea level made by the same vessels, were, in 1897, still in a good state of preservation.

**Tides.**—High water, full and change, in Berkeley Sound is at 5h.; springs rise 7 feet.

**William Point** is the extremity of a long, narrow tongue of land separating Berkeley Sound and Port William.

**Cape Pembroke** is the eastern extreme of a white sandy promontory forming the south side of Port William.

**Light.**—From a black iron tower with one broad white band, 70 feet high, there is shown at an elevation of 99 feet above high water a flashing white light visible 16 miles. For arc of visibility, see Light List.

There is a signal station at the lighthouse.

**Port William,** which includes Stanley Harbor, affords good anchorage, sheltered from all the prevailing winds. The entrance, 2.2 miles wide, between William or Memgeary Point on the north,

low and rocky, and Cape Pembroke on the south, well marked by the lighthouse.

**Beacon.**—A black beacon 26 feet high and surmounted by a cone is erected on William Point.

**Charles Point** (Galeway Point), also on the north shore, has two small detached rocks at its extremity, off which is a kelp patch extending about ⅛ mile; there is deep water close to the edge of the kelp.

**Seal Rocks,** about 1 mile east by north of Cape Pembroke, are clean on all sides. The tidal streams run 3 knots an hour between the cape and the rocks, the flood stream northward and the ebb southward.

**William Islets** (Tussac Islets) lie about ½ mile off the south shore of Port William, between Cape Pembroke and Yorke Point, and are steep-to beyond the kelp.

**Billy Rock** lies between William Islets and Seal Rocks, with Cape Pembroke Lighthouse bearing 219°, distant 1,100 yards. It shows at half tide, or when there is much swell, but is covered at high water. There is a little kelp close around it and deep water close to its east side.

This rock is particularly to be guarded against in leaving Port William to pass around Cape Pembroke during the ebb stream, for no tidal stream is felt while running out of the port until near the rock, when, the outside stream being met running strongly southward, a vessel is very likely to be swept toward the rock unless allowance be made for it. The passage between Billy Rock and East William Islet should not be attempted.

**Yorke Point,** 2½ miles west of Pembroke Point, is steep-to and may be approached to 100 yards. The space between this and Arrow Point is wide enough for large sailing vessels to work in, and the edge of the kelp is a secure guide: but the white sandy bay on the south side should not be entered, as it is shallow. In standing toward it a vessel should tack when on the line of the islets and Yorke Point. When past Yorke Point, Sparrow Cove will be opened on the north side of the port, under Mount Low, and the entrance of Stanley Harbor on the south side.

**Anchorage.**—Vessels that remain in Port William will find good anchorage in Sparrow Cove and an unfailing supply of good water in its northwest corner. Nearly ½ mile southwest of the entrance of the cove is Doctor Point, on which stands a signpost pointing to the Narrows of Stanley Harbor; on Tussac Point is a similar post.

**Murrell River.**—From the head of Port William winds a long creek through the hills to the westward about 3½ miles, to Murrell River. It varies in width between 400 and 100 yards for the first

mile, with depths of 2 to 3 fathoms, beyond which it shallows rapidly. so that a boat can not get up until the flood stream makes.

**Landing.**—The landing on all the beaches is bad for boats in consequence of bowlders; the best landing is on the rocks, where the shores are steep-to.

**Water.**—There is a very good watering place on the west side of the cove on the north shore, in a bight outside the entrance to Weir Creek, but care must be taken in landing on account of the stones. Nearly every hollow has a small stream running through it and peat is plentiful.

**Stanley Harbor.**—The entrance to this harbor, in the southwest part of Port William, is a little more than 300 yards wide between Engineer Point on the east and Navy Point on the west, and the deepest water is toward the latter; all dangers are marked by kelp. The harbor is excellent, being a large natural dock, 3 miles long, east and west, by about ¼ mile wide, with stiff mud bottom. On the south shore, on the slope of the Murray Heights, is the town of Stanley, the seat of government, with a population of about 1,000. The climate is raw; hail and snow storms are not rare, even in summer. The land is not adapted to agriculture. The inhabitants are chiefly occupied in sheep and cattle raising. There is no hospital.

A camber for lighters has been constructed at the naval coaling depot on the northern side of the harbor.

**Communication.**—The Pacific Steam Navigation Co.'s steamers bring mails from England every four weeks, touching at Rio de Janeiro and Montevideo, proceeding thence to Punta Arenas and Valparaiso, and returning the same way. Within the colony mails are distributed by vessels of the Falkland Islands Co.

Telegraphic communications are mailed from Monevideo.

There is telephone connection with the settlement at Darwin Harbor and also with Cape Pembroke Lighthouse.

**Radio.**—There is a radiotelegraph station on Navy Point. It is open to the general public from 9 a. m. to noon and from 9 p. m. to midnight. Call letters Y. P. C.

**Quarantine.**—Arriving vessels must be granted pratique by the health official, whose representative comes on board directly on arrival. Foreign cattle can be landed only by official permission.

**Customs** matters are as in English ports.

**Coal and supplies.**—The amount of coal kept in stock is about 1,000 tons, stored in sheds. There are three lighters, holding 80 tons, but coaling is slow; not more than 40 tons can be put on board during a working day, but perhaps as much as 120 tons by working day and night; strong winds in summer and snow squalls in winter interrupt coaling. Small vessels can go alongside the hulks at the jetty, but the depths are only 8 to 10 feet; a tug tows lighters to ships.

Mutton and beef of the very best description may be purchased in any quantity; fish are plentiful, but hares, rabbits, and vegetables are scarce. Stores of all kinds can be obtained in Stanley Harbor. Water can be obtained from a Government reservoir containing 200 tons, or it will be sent off by a private firm. Wood is scarce, but peat, a fair substitute, is plentiful, and when compressed is found to be a valuable fuel.

**Jetties.**—There are five jetties abreast the town—the sanitary jetty, the East and West Falkland Islands Co.'s jetties, the new Government jetty (between the Falkland Islands Co.'s jetties), and the dockyard jetty. The sanitary jetty extends 38° 144 feet beyond high-water mark. It is 12 feet wide and has a depth of 3 feet at low-water springs, alongside the end of the pier. The new Government jetty, known as the public jetty, consists of 100 feet of stonework, and 160 feet of wood piles; it is 28 feet wide with a T at the end, 80 feet wide.

The Falkland Island Co.'s east jetty has a depth of 9 feet at its extremity, and the west jetty 12 feet.

**Repairs.**—Small repairs to machinery can be undertaken by the Falkland Islands Co., which has on the wharf a crane lifting half a ton and in the smithy one lifting a ton. A diver can also be furnished.

**Port charges.**—Stanley is a free port. There are no charges except pilotage.

**Tug.**—There is a steam tug, fitted with salvage pumps, to render assistance to disabled vessels.

**Observation spot.**—The stone marking the spot, near Navy Point, where magnetic observations were made by the British war vessel *Challenger* in 1876, was in 1897 replaced by a new one with "Variation" engraved on the top, and "H. M. S. Retribution, 1896," round the side.

**Trade.**—The principal exports are wool, sheepskins, tallow, and live stock; the imports, groceries, general provisions, hardware, machinery, timber and building materials, clothing, spirits, ship chandlery, etc. Stanley is the home port of six coasters.

**Anchorage.**—Stanley Harbor is easy of access, snug and secure, but for large vessels the anchorage is somewhat confined, as the deep-water space is only a narrow strip running east and west in the middle of the harbor.

A vessel drawing 10½ feet of water can, with anchors as off-fasts, lie securely alongside the hulk sunk at the end of the dockyard jetty; here the British war vessel *Beagle*, 1897, found a least depth of 13 feet; soft mud bottom.

Deep-draft vessels should anchor south of Navy Point in 4½ to 5 fathoms water; others may approach nearer the town.

Sailing vessels bound round Cape Horn should not enter Stanley Harbor, as the wind that would be fair outside would be foul for getting through the Narrows; they may anchor about ¼ mile outside the entrance, in 6 to 7 fathoms water, at 600 yards from the shore, in a perfectly landlocked position, William Point, just hidden behind the land near Ordnance Point, bearing 64°, and from here can leave with any wind. But those coming from Cape Horn may enter, as any wind that would be fair outside if bound to the northward would also be fair to leave the harbor.

**Forth Shoal—Buoy.**—The Forth Shoal, with a least depth of 10 feet, lies 350 yards westward of Tussac Point. It is marked on its northwestern side by a red barrel buoy.

**Shoal.**—A small shoal with depth of 18 feet over it is situated in a position from which the flagstaff of the United States consulate bears 222° distant 700 yards, and the rock painted white 122°. It is 10 feet in extent, consists of mud, and is marked by kelp.

**Beacons.**—Two beacons, erected on shore, at 1¼ miles eastward of the dockyard, when in line bearing 179°, lead into Stanley Harbor midway between Navy and Engineer Points.

The rear beacon consists of two upright posts, 27 feet high and 8 feet apart, faced by two sheets of corrugated iron, painted white with a black vertical stripe down the center. The front beacon consists of a pair of sheers, 29 feet high, painted white.

**Directions.**—Approaching from the northward with a fair wind, after rounding Uranie Rock steer for the lighthouse on Cape Pembroke; some white sand hills will then be seen ahead, close to Kidney Island, and at the same time the Seal Rocks will be on the horizon just open off Cape Pembroke.

Coming from the southward, with a flood stream, it is necessary to guard against being swept too near Cape Pembroke or the Seal Rocks. With a commanding breeze sailing vessels have passed between Seal Rocks and the cape, and although it is prudent in general to pass outside them, if a sailing vessel should be set toward these rocks, the only alternative would be to pass between them and the cape, as the tidal stream sets through strongly; Billy Rock, 1,200 yards westward of Seal Rocks, must be avoided.

In passing Cape Pembroke bound to the southward, the same rule applies as when bound into Port William; and in light winds or much swell, on the ebb, it is better to pass well to the northward of Seal Rocks, in order to allow for the tidal stream running to the southward.

When the land can be made out, bringing the eastern hill, Mount Low, 840 feet high, kept on the bearing 12° will lead into the shore, where it can be approached in perfect safety, just south of the en-

trance to Port Harriet. The Wolf Rock and Cape Pembroke Lighthouse will then be seen, and course may be shaped for Port William. By night Cape Pembroke Light will be a guide.

If the wind be off the land a vessel might pass inside the Wolf, avoiding Maggie Elliot Rock with 2¾ fathoms, distant 1¼ miles 298° from the Wolf and about 1 mile offshore, which may not break with the wind off the land. Without a commanding breeze, it is better to pass outside the Wolf.

Coming from the northward, with westerly winds, make Cape Carysfort; with easterly winds, Volunteer Point; when they are passed, steer for Cape Pembroke Lighthouse, until Port William opens out, when run in and anchor, or wait for a pilot. In case of darkness or fog, vessels may anchor in the mouth of Berkeley Sound or Port William, or stand off and on, as may be expedient, there being no danger not marked by kelp.

**Directions for Stanley Harbor.**—If the wind be southerly the passage into Stanley Harbor, which is about 300 yards wide, should not be attempted under sail except by a small quick-working vessel; but there should be no difficulty with the wind to the westward of southwest. Care is required in rounding Tussac Point to avoid Forth Shoal which extends from it 350 yards to the westward, its northwestern side being marked by a red barrel buoy.

The leading beacons in line, situated on the south shore of the harbor, bearing 179°, clear Forth Shoal and lead midway between Navy and Engineer Points.

If the wind be southwest, making it necessary to pass very close to Navy Point to fetch through, a sailing vessel should work well up to windward of the entrance and enter the passage under all sail and with good way on; directly the sails lift, from the wind drawing out in passing the point, keep a little higher so as to shoot through with the sails shaking until the steady wind inside the point is obtained.

When through the Narrows, the harbor may be traversed by any vessel drawing under 20 feet; there are depths of 3½ fathoms at 200 yards from the kelp on each side, and about 4½ fathoms in midchannel close up to the town on the south shore. Large vessels have plenty of room to round-to and anchor in midchannel, as far up as they choose to fetch. After passing the Narrows the bottom is excellent, consisting of a stiff mud which often causes some trouble in lifting the anchor.

**Tides.**—High water, full and change, in Port William and Stanley Harbor is at 5h. 30m. and 5h. 40m., respectively (the latter approximate); springs rise 7 feet, neaps 5½ feet.

**Tidal streams.**—On the southeast coast of the Falkland Islands there is so little tidal stream that it need not be considered, though a current of ½ to 1 knot an hour will generally be found running

with the wind; but after passing Port Harriet a strong stream begins to be felt.

The flood stream runs to the northeast, past the Wolf Rock, and becames stronger as it approaches Cape Pembroke, where the rates are from 2 to 3 knots, according to the age of the moon. The flood runs directly northward from the Seal Rocks to Volunteer Point, while very little tidal stream is felt within the heads of Port William or Berkeley Sound. The ebb runs southward with equal strength, and with a strong breeze, a heavy tide rip extends 2 miles offshore.

**Port Harriet,** the entrance to which is about 5½ miles southwest of Cape Pembroke, is separated from Stanley Harbor by a ridge, the distance across being about 2¼ miles. Vessels working from the southward and intending to touch at Port William, with a strong northerly breeze and a high sea, or with night approaching, would find excellent anchorage in the entrance to Port Harriet.

**Seal Point,** the south entrance point, is low and has off its extremity a round, low mound, to which it is joined by rocks; off this mound a ledge extends about ½ mile to the eastward, but kelp marks its extent.

**Outer anchorage.**—There is anchorage in 6 to 7 fathoms water just outside a small 3-fathom kelp patch nearly in mid-channel, or in 3½ to 4 fathoms to the westward of it.

Only winds from east-northeast to southeast would raise any sea in the entrance, and these seldom blow; and should the wind come from these directions and be too strong to work against, by running in over the bar a secure anchorage may be found quite sheltered.

**Supplies** could be obtained at this anchorage from the settlement in Stanley Harbor while waiting for a fair wind. There is a good stream of fresh water in a cove on the north side about a mile inside the entrance.

**Bar.**—At about ½ mile within the kelp patch a bar extends from Lake Point (off which there is a small detached rock) across to the south shore at about 1 mile within Seal Point. The deepest water on the bar, 3 fathoms, fine sand, is in mid-channel, shoaling gradually to 2 fathoms close to the kelp on each side. It suddenly deepens on its inner edge from 4 to 7 fathoms, the bottom changing from fine sand to mud.

No marks are necessary for crossing the bar, the above description being sufficient.

**Inner anchorage.**—After passing the bar Port Harriet affords excellent anchorage for an extent of 3 miles, the width being nearly ¾ mile. All the dangers are marked by kelp except in one place, about half way up the harbor, where a sand bank, without kelp, ex-

tends about 200 yards off the south shore. The best anchorage is in midchannel, in order to have plenty of room for getting under way if the wind should be blowing strong off either shore; the depths are 5 to 8 fathoms and the bottom is soft black mud.

The shores of the harbor are generally swampy, and the port will probably never be of any importance beyond affording a good temporary anchorage for a vessel that can not reach her destined port before night.

The head of the harbor terminates in a creek which extends about 2 miles to the westward. It is only 200 yards wide at the entrance, but gradually widens to about ½ mile near the head. For a mile inside the entrance of the creek there is anchorage for small vessels in 2 or 3 fathoms of water; but beyond that it becomes shallow and rocky, and at low water dries ½ mile from the head.

**Tides.**—High water, full and change, is at 5h. 0m. p. m.; springs rise 6 feet. Scarcely any tidal stream is felt in Port Harriet.

**Port Fitz Roy.**—The coast between Port Harriet and Port Fitz Roy, 9 miles to the westward, is bold, rocky, and nearly straight, except about halfway, where a small bight with a white beach opens to the eastward. From Port Harriet to Beach Point there is no danger outside the kelp that fringes the shore; but between this point and East Island, which forms the south entrance point of Port Fitz Roy, there are numerous kelp patches.

From Beach Point the coast trends westward 4 miles to a bay open to the eastward, in the middle of which is a rock dry at low water and surrounded by kelp. Bold Point, the south horn of the bay, is the north entrance point of Port Fitz Roy. From the north side of the bay a narrow inlet leads to North Basin, passing through a gorge in the ridge of low hills; the depth in the narrow part is about 1 fathom. The basin is a mile long, east and west, and very shallow.

**A bar** extends from the west end of East Island across the entrance of Port Fitz Roy; the deepest water is close to the south edge of the kelp patch on the north side; here the depth is 3 fathoms, gradually shoaling to 2 fathoms close to the kelp off East Island; northward of the kelp patch there is a narrow passage with 2½ fathoms, but a sailing vessel could pass through only with a fair wind.

**Anchorage.**—For 3 miles within the bar the port is fully a mile wide, and quite clear of danger to within 400 yards of the shore, to which distance the kelp nearly extends. This wide part affords excellent anchorage in 4 to 6 fathoms, mud bottom. Off White Point on the north shore a sand spit, without kelp and with less than a fathom of water, extends about 400 yards; it is easily seen, as the water appears quite white.

**East Road.**—Between the west end of East Island and East Point, ¾ mile to the westward, are several small islets, between which a deep but narrow and winding channel leads into the port; it is well marked by kelp, and the depths are from 4½ to 7 fathoms; some rocks nearly awash lie very close inside the kelp edge, on both sides of the channel. The middle part of the channel expands into East Road, about ⅓ mile wide, which forms a good anchorage for small vessels.

A large vessel, however, should not attempt under sail the East Road Channel into Port Fitz Roy unless the wind is between south and east, nor to leave by it unless the wind is between north and west, as nothing but a small craft could work through it, and in some parts it is too narrow for a large vessel to bring up.

**Fitz Roy Basin.**—On the north shore of the port is a remarkable gorge in the ridge of low hills, through which a narrow inlet runs for about ½ mile, with depths of 1½ to 2 fathoms, and then opens into Fitz Roy Basin, large and shallow, like North Basin. Westward of the basin is Fitz Roy Cove.

**Head of the port.**—About 3 miles inside the bar the port is divided into two arms by a peninsula and Tussac Island. The southern arm, about 1½ miles long, is very shallow, and nearly covered with kelp, except close to Tussac Island, where there is a small patch of clear ground with 2 fathoms water.

Northward of Tussac Island, and directly in the middle of the entrance to the northern or main arm, there is a large patch of kelp in a depth of 6 feet. On the north side of this patch is a channel ¼ mile wide, with 3½ fathoms water for about a mile; about 1 mile beyond will be found the best anchorage for small vessels, in 2½ fathoms, soft mud, abreast Garden Point, on the north shore, where the arm turns to the northward.

Off Garden Point and the point on the opposite shore some rocks dry at low water, but the kelp extends well outside them, leaving a passage in midchannel nearly 400 yards wide; the arm then expands into a broad space, but all shallow except in the channel, which is about 200 yards wide, with depths of 2 to 3 fathoms.

On the north side of this open space there is a narrow opening, through which the channel runs to the eastern shore, so steep-to that vessels may lie in 4 fathoms water alongside the rocks, which would only require leveling to make excellent wharves; but the channel is hardly wide enough for swinging a long vessel, the opposite side being low, with rocks lying some yards from the shore.

Inside this passage the arm expands again to a wide creek which extends above 2 miles to the westward and ends in Fitz Roy River, a small fresh-water stream. Much of this upper space is dry at low water, so that a boat can not get within 1 mile of the river. There is

good anchorage for small vessels for ½ mile inside the narrows, in 2 and 3 fathoms water, muddy bottom.

**Directions.**—The entrances to Ports Fitz Roy and Pleasant are difficult to distinguish, when standing in direct from seaward, as the land around them is low and the points can not be made out distinctly until close-to. The best guide is the high range of hills north of Port Fitz Roy, with three peaks near together, the middle one showing a broad flat summit.

The westernmost and highest peak, Mount Kent, 1,535 feet high, bearing 338° will lead directly to the entrance of Port Pleasant, and clear of the large kelp field south of Pleasant Road. The same hill bearing 304° will lead direct to the end of the kelp off East Island, and the kelp will then guide into either channel of Port Fitz Roy.

The best course into Port Fitz Roy, coming from the eastward, is to the northward of all the kelp patches between Beach and Bold Points, keeping close to the kelp on the main shore, where the passage in the narrowest place is over ¼ mile wide; but if blowing hard from the southward, it would be advisable to keep to the southward of all the kelp patches, and run for the large kelp patch that extends over 1 mile off the east end of East Island.

The inner edge of this kelp patch will lead direct into Port Fitz Roy; but when abreast of the island keep toward the north shore, passing just south of the large kelp patch that lies northwest of the bar and between the two channels.

**Tides.**—High water, full and change, in Port Fitz Roy is at 5h. 0m.; springs rise 6 feet.

**The tidal stream** is scarcely felt in Port Fitz Roy, except through East Road Entrance, where it runs about 1½ knots an hour; in the narrows near the head it is rather stronger.

Port Pleasant, immediately south of Port Fitz Roy, has two entrances, formed by Pleasant Isle, a long narrow island, with some islets. These islets are surrounded by a large and thick kelp patch 2 miles long, the edges of which are the best guides into both entrances. Off Pleasant Point, the south entrance point, a kelp patch extends over 1 mile to the eastward, with rocks which break heavily in southerly gales. Mount Kent, bearing 338°, is a good mark for making the port.

**A bar** lies across each channel into the port; that in the north channel is abreast the second of the small islets; that in the south channel a little inside the east end of Pleasant Isle; the deepest water on either bar is 2½ fathoms, but vessels drawing 17 feet might enter, with a leading wind, during the last quarter flood. The north bar has 2½ fathoms right across to the kelp on each side; but the south bar has 2½ fathoms close to the island kelp only, thence shoaling to 1½ fathoms on the south shore.

The north channel is therefore the best for large sailing vessels, but they must have a fair wind, as a little within the bar the channel is contracted to about 100 yards by one of the small islets; here the depth is 8 fathoms, the channel being quite steep-to on both sides. Inside this contraction the harbor expands to about ¾ mile, that width continuing to the junction with the south channel, at the west end of Pleasant Isle; the bottom in all this space is soft mud, with depths of 6 to 10 fathoms water.

After passing the bar at the south entrance the depth will be 4 fathoms to where it joins the north channel; but about 1 mile inside the bar, off a remarkable white sand patch on the south shore, there is a low projecting patch of rocks, nearly covered at high water, from which extends a sandbank with a depth of less than 1 fathom.

The water over the bank appears quite white, making it easily seen; but the best plan is to keep the island kelp close aboard when entering by the south channel, and directly the vessel has passed the west end of the island stand over to the northwestward to avoid the shallow bank along the south shore.

**Island Harbor.**—From the head of Port Pleasant, at Turn Point, a narrow passage winds through the hills for about 3 miles to the southwest, leading into Island Harbor. For the first mile the passage is about ⅓ mile wide; it then expands to an area about ¾ mile each way; the deep channel runs close to the south shore of this space, and then turns southward for 2 miles, again narrowing, and in some places scarcely 100 yards wide.

There are depths of 4 and 5 fathoms in the channel, and though it occasionally crosses from side to side no small vessel would find any difficulty in sailing through with a fair wind. Island Harbor is nearly all shallow and a mile from the head it is nearly dry at low water, but there is space near the entrance for small vessels to moor in 2 to 3 fathoms water.

The shores of Port Pleasant are the favorite resort of numerous herds of cattle, perhaps in consequence of its fresh-water lakes, on the banks of which grows a short, rich grass.

**Tides.**—High water, full and change, is at 5h. 0m.; springs rise 6½ feet.

**Tidal streams.**—The tidal stream in both entrances to Port Pleasant runs nearly a knot an hour at springs; in the narrow pass of the north entrance, just within the bar, nearly 2 knots.

**Pleasant Road,** immediately southward of Port Pleasant, is well sheltered from the southward and southeastward by a bed of kelp, which extends 3 miles offshore and is 2½ miles wide; in this kelp are three small islands about a mile offshore. The road is exposed to northeast gales, but these are not frequent; the holding ground is

good sand, with a stiff clay under it. The British war vessel *Arrow* rode out a northeast gale here.

**Kelp Lagoon,** a shallow body of water southwest of Pleasant Road, is about 3½ miles long and 1 to 2 miles wide, with several islands and two entrances; both entrances are blocked up by kelp, which extends nearly 2 miles offshore, and is a continuation of the large kelp patch south of Pleasant Road.

**Choiseul Sound** (locally pronounced Chisel) is 26 miles long east and west, and 3½ miles wide at the entrance, between Fox Point and Lively Island, gradually narrowing toward the head. In the western corner is Bodie Inlet, a long and narrow creek, which extends about 4 miles to the westward, varying in width between ¼ mile and 100 yards.

**Anchorages.**—The whole of Choiseul Sound is studded with islands which form well-sheltered anchorages for small vessels; there are also numerous creeks and coves, in many of which they may lie securely. Large vessels can bring up in almost any part of the sound in 12 to 18 fathoms water; the bottom is mud, but generally covered with shells and weed, the arming of the lead appearing to indicate a rocky bottom; but the rocky dangers are marked by kelp.

The shores of the sound are all low and intersected by numerous ravines, with small streams; but many of these are dry in the middle of summer, particularly to the southward of the sound.

Fox Point, about 9 miles southwest of Pleasant Road, the north point of entrance to Choiseul Sound, is best known coming from the eastward, by the long, white, sandy beach to the northeast and a small dark islet (Direction Islet) that shows plainly on the white background. Fox Point is the southern extremity of this long beach and has off it a small islet and kelp extending about 2 miles farther to the eastward.

The entrance, between the mainland and Phillimore Island, is 3 miles wide, but divided into two channels by Middle Island, which lies nearly 1 mile north of Phillimore Island. A long kelp patch runs 2 miles eastward from Middle Island, and in it are two small islets, and near its outer extremity a large black rock.

The best channel into the sound is northward of Middle Island and between it and the two Black Rocks, several feet above water, which lie about ½ mile off the north shore, with a long tail of kelp to the eastward. There is a passage with 3½ fathoms water between the rocks and the shore, but only small vessels can work through it.

The channel between Middle Island Rocks and Black Rocks is about 1 mile wide and clear of all danger except two or three small patches of kelp inside, which are easily seen. The channel between Middle and Phillimore Islands is deep and ¾ mile wide, but full of

large kelp patches. Westward of Middle Island the south channel is divided by Green Island.

**Mare Harbor.**—After passing the Black Rocks, in the north channel to Choiseul Sound, the first opening in the north shore leads into Mare Harbor, one of the finest on the coast, and easy of access for the largest vessels.

The entrance is 1½ miles wide, but on the western side the kelp extends a long way from Seal Island, contracting the channel to less than ½ mile, but inside it opens into a clear piece of water about 1½ miles long and 1 mile wide, with excellent anchorage in 6 to 10 fathoms water, muddy bottom. The soil appears good, and, except in the bottoms of the valleys, there are no swamps; cattle are numerous.

**East and West Coves.**—On the east side of Mare Harbor an opening about 400 yards wide leads to East Cove, another very fine harbor and the best for a vessel making a long stay; but with westerly winds a large sailing vessel could not work out. The cove is about ¾ mile wide, and ends on the east in two other coves, with sufficient water for small vessels.

On the western side of Mare Harbor are also two coves; one of them, West Cove, is nearly 3 miles long, and for nearly 2 miles affords good anchorage for small vessels in 2½ to 3 fathoms water.

**Swan Inlet** stretches from the northern side of Mare Harbor, 7 miles to the northwest, and terminates in a small river. For 5½ miles this narrow inlet has depths of 1 to 2 fathoms; it then opens into a wider space and becomes so shallow that a boat can not go higher at low water. In some parts of the inlet the shores are so steep that a vessel may lie alongside the rocks. Water can be found in most of the hollows, but in the middle of summer the smaller streams are dry.

**Victoria Harbor,** on the south side of Choiseul Sound and about 12 miles west of the entrance, is formed by a peninsula, 7 miles long, extending to the eastward parallel with the shore; there is good anchorage for large vessels in 5 to 10 fathoms water as far as Heifer Point, on the south shore at the entrance of Miles Creek, beyond which the depths gradually decrease toward the head. Off the entrance of the harbor are two clusters of islands, between which and the shore is also excellent anchorage.

**Settlement.**—There is a settlement on the west side of Walker Creek, south of the entrance to Victoria Harbor.

**John Point.**—Close westward of John Point, on the north shore, the bottom of the sound is rocky, which renders it an unsafe anchorage.

**Darwin Harbor,** in the northwest corner of Choiseul Sound, is a good harbor, but the entrance, which lies between Squib Point and two large clusters of islands, is narrow.

Vessels in entering Darwin Harbor follow the curve of the kelp and islets forming the west side of the narrows until abreast Squib Point, when they should borrow on the eastern shore before turning into the anchorage, to avoid the shoal ground and kelp extending from the northeast side of the island on the west side of the channel.

Kelp and docky ground, with depths of less than 3 fathoms, extend southeast about ½ mile from Squib Point.

**Hare Island.**—Kelp extends for 300 yards from the northwest side of Hare Island. This island is a nursery for hares.

**Settlements.**—There is a settlement on the point about ½ mile west-northwest of Hare Island, with a jetty on the north side of the point, about 1¼ miles north of this, on the south side of a bay on the western shore, is Darwin settlement consisting of about 15 houses. Here there is a flagstaff on the summit of a hill. A telegraph line connects Darwin Harbor with Stanley.

**Supplies.**—Mutton and a small quantity of vegetables may be obtained; rabbits may be shot on Scott and Rabbit Islands and West Arrow Islets and hares on Hare Island; teal and geese are plentiful.

**Anchorage.**—The British war vessel *Swallow* (1898) anchored in 2¾ fathoms water, with the settlement bearing about west-northwest, distant 250 yards.

**Arrow Harbor,** southward of Darwin Harbor entrance and of Arrow Island, affords another good anchorage, in 4 to 5 fathoms, mud.

**A rocky ledge,** 140 yards in extent, reported by the British war vessel *Cambrian* (1903) with 13 feet over it at low water, lies with the eastern extremity of Arrow Islands bearing 15°, distant 900 yards, and the islet off John Point 88°.

**Tides.**—High water, full and change, at Mare Harbor, Choiseul Sound, is at 6h. 0m.; springs rise 6 feet; and at Darwin Harbor, at 6h. 30m.; springs rise 5½ feet.

**Tidal streams.**—The tidal streams run nearly a knot an hour at the entrance of Mare Harbor.

In Choiseul Sound there is but little tidal stream, except in the entrances to creeks and between the islands. In the south entrance to the sound both ebb and flood are strong, at springs about 1½ knots an hour, and when blowing hard they cause a ripple off Pyramid Point, which is dangerous for a boat. The flood sets to the northward in this entrance, but in the north entrance there is scarcely any stream, and the little flood there is runs to the eastward out of the sound.

**Lively Island and Sound.**—Lively Island, lying off the entrance of Choiseul Sound, is 6 miles long by 5 miles wide; reefs, with passages between, extend 4 miles off its northeast point; reefs also extend about 1 mile from Prong Point, the southeast point, and 2 miles from Reef Point, the southwest point. There is good tem-

porary anchorage on the west side of Lively Sound and northward of Motley Island, from which latter kelp with a small islet in it extends ½ mile to the southeast.

Any vessel bound to the westward and not able to reach Bull Road before dark would find this the best anchorage, but if it should be blowing hard from the southward or southeastward a heavy swell would set into Lively Sound. In this case it is safe to run up the sound, taking care to avoid the shoal extending 1½ miles westward of Sal Point and the shoal off Seal Island, and either haul to the westward into Seal Cove or anchor in Pyramid Cove, on the north side of Pyramid Point, where there is good anchorage, in 5 to 8 fathoms, sandy bottom, with a stiff clay beneath.

**Kelp Bay.**—Good anchorage is also to be found in Kelp Bay, on the northwest side of Lively Island, in 8 fathoms water, broken shells with mud underneath, with the west extremes of Phillimore (main) Island and Reef Island in line about 1°, and north end of Kidney Island 259° it affords shelter from north, through east, to west-southwest. The anchorage is said to be better slightly to the northward, with Kelp Island bearing 250°.

**Settlement.**—There is a settlement on the north side of Lively Island, about 1 mile east of the anchorage in Kelp Bay.

**Seal Cove.**—For vessels remaining any time there is no better anchorage than in Seal Cove, which is sheltered from every wind; the land around it is very good, particularly in the valley between it and Low Bay, and it is well watered. There are large rivulets running into the head of the cove, and several small streams on the north shore close to where vessels would anchor. The water is deep close round the kelp on the north side of Seal Island, and though long kelp reefs project from it, there is plenty of room.

**Low Bay** has its entrance, 3 miles wide, between the north point of Bleaker Island and the rocky Triste Islands on the opposite shore; inside the bay expands to a width of 8 or 9 miles, with depths of 15 to 22 fathoms.

This bay is indented with several bights and bays, which, although inviting in appearance, are not advisable anchorages, as the ground is rocky and foul in many parts, and a heavy swell rolls in with southerly gales. There is no danger in the bay except a patch of rocks, dry at low water and fringed with kelp, on the western shore midway between Bluff Head and Turn Island. The outer edge of the patch bears from Bluff Head 201°, distant 1¾ miles.

**Bluff Head** may be easily recognized, being a dark bluff cliff, 60 feet high, and the most conspicuous object in the bay; a small islet lies close to it. In this part of East Falkland and to the southward the land is low, few places being of greater elevation than 150 feet.

**Tides.**—High water, full and change, in Low Bay is at 5h.; springs rise 5½ feet.

**Tidal streams** at the entrance run about 1 knot an hour.

**Shag Rock,** lying about 5 miles off the entrance to Low Bay, is an excellent guide when running from the southward for either Lively Sound or Adventure Sound. It is a high-peaked mass which can be seen 5 or 6 miles, and there is no other island that resembles it. The lowland is all so much alike that it is almost impossible for a stranger to recognize his landfall, particularly as the high range of hills is seldom seen so far south; but the Sea Lion Islands or the Shag Rock being made out, the chart will show the bearings of the points.

**Bleaker Island** is a long, low, narrow island lying at the entrance of Adventure Sound. A bay on its northeast side, north of Sandy Bay Island, makes the most convenient anchorage between Lively Sound and Bull Road. The water is deep, and close to the head, in a depth of 12 fathoms, a vessel is well sheltered from almost every wind. The anchorages are very good inside Bleaker Island, but as there is no passage out between the southwest end of the island and Driftwood Point, they are not convenient for vessels bound to the westward.

Between the north end of Bleaker and North Point Island there is a passage for small vessels with depths of 5 or 6 fathoms. At 3 miles south from North Point Island is Halt Island, with a long kelp spit extending northward, affording for small vessels a fair anchorage inside in 6 or 7 fathoms water, bottom of stiff mud. There are no other anchorages around Bleaker Island.

To the southwestward long spits run off the points of the island and there are several kelp patches, but the water is deep between and around them. There are ponds of fresh water on the island, quantities of wild fowl, and heath fuel.

**Adventure Sound** is about 20 miles long, from Bleaker Island to its northwestern extremity, with a general width of 3 to 4 miles. It contains several good harbors and various creeks and coves. Those on the southwest side are to be preferred, being sheltered from the prevailing winds. It has several islands and its shores are fringed with kelp.

The two best harbors are in the southern part of the sound. The principal one is Adventure Harbor, the other Moffit Bay, 1½ miles to the southward. Barrow, Fox, and Sulivan Harbors, in the order given, lie northwestward of Adventure Harbor. The creeks and coves on the northeast side of the sound are suitable only for boats and small vessels.

**Adventure Harbor** will accommodate vessels of any class. Excellent fresh water may be obtained from the ponds, which are frequented by quantities of wild fowl.

Fuel may be obtained here in the dry season for daily use by gathering the heath, which is excellent for cooking, the resinous qualities producing a very powerful heat. Driftwood also may be procured from the seacoast, but the distance is great and to collect it requires much time and labor.

**Directions.**—Having rounded Bleaker and North Point Islands a course 249° for 4 miles will lead to abreast Little Island, a small, dark-looking mound of tussac, whence a course 226° for nearly 3½ miles will lead to the entrance of the harbor; this is clear of all danger and a good berth may be taken in 5 to 12 fathoms, stiff mud.

A lookout must be kept in going up the sound for a kelp patch lying 164° distant 1¼ miles from Little Island, and about the same distance from the Sisters; there is, however, plenty of water close to the kelp.

**Moffit Bay,** 2 miles southward of Adventure Bay, has depths of 7 to 10 fathoms, but is less easy of access than Adventure Bay.

**Barrow Harbor** lies about 3 miles northwestward of Adventure Bay. If proceeding for this harbor, after having passed Turn and Large Islands, which have deep water close to them, little direction is necessary, as no danger exists in the passage. Steer to pass close north of Kelp Island, which is steep-to on the northern side. On gaining the harbor a berth may be taken in any depth from 4 to 10 fathoms, good bottom; for small vessels the two arms of the harbor will be found equally convenient. Good water and fish may be procured here as plentifully as in Adventure Harbor.

**Fox Harbor,** the next anchorage northward of Barrow Harbor, is not so desirable, as it has less water, and there are some shoals; it is, however, a good place for small craft, and fish abound in its creeks from November to February.

**Great Island** lies off the north point of entrance to Fox Harbor, and from its north point a rocky spit extends ½ mile to the northward, partly dry at low water, with 4 fathoms close to the kelp. Between the Island and Low Point is a passage for boats and small craft, with 3 fathoms of water; the shore thence to the Promontory, on the east side of Sulivan Harbor entrance, can be approached only by small vessels, several kelp patches lying off it.

A patch of kelp, with depths of 5 and 6 fathoms close to its edge, lies nearly ½ mile 136°, and a small round island, named the Button, 88° of Great Island; between them and Great Island the water is deep, but the passage is narrow.

Vessels proceeding to the upper part of Adventure Sound, after passing Turn Island and Shell Point, must be keep a lookout for a small kelp patch nearly midway between Shell and Button Islands, and bearing from the former 271° distant rather more than 1 mile.

Then passing ¼ mile northeastward of Great Island Spit, a course 305° for 3 miles, will lead between Promontory and Saturday Points.

**Sulivan Harbor** has good anchorage in 3 to 6 fathoms, muddy bottom, and in the creeks and arms abundance of fish, wild fowl, and good water will be found.

**West Arm.**—Small vessels may proceed up West Arm by keeping close to the north shore when abreast the little spit that extends from the opposite side; the passage there is very narrow, and the tidal stream runs out strongly, but there is plenty of water. Small craft may also anchor inside North Island.

**Tides.**—High water, full and change, in Adventure Sound is at 5h. 30m.; springs rise 5½ feet.

**Tidal streams.**—With the exception of the narrow passage in the West arm, the tidal streams are very weak.

**Sea Lion Islands** consist of one large and three small islands lying 10 miles southward of Bleaker Island. They extend east and west for about 10 miles; from the eastern islet an outlying reef is distant 3½ miles, 75°. There is a safe passage just eastward of the large island, but a long reef, which breaks heavily, extends 3 miles southward from that island, requiring a good lookout when running for the opening.

**Beauchene Island,** the summit of which is in latitude 52° 54′ south, longitude 59° 12′ west, is about 2 miles long and ½ mile wide. Its northern end point rises to a green mound 271 feet high; the southern end, less than half that height, is all rocky; the south and east sides form high cliffs, but the west side slopes gradually to the sea. There is no known danger beyond ¼ mile from shore.

**Mintay Rock.**—A sunken rock is said (1841) to exist 3½ miles 227° from the south extreme of Beauchene Island; care should therefore be exercised when passing southward of the island.

**Directions.**—Vessels from the southward, bound to Stanley Harbor, should make Beauchene Island. If wishing to get into a port before dark, they should endeavor to make the west end of the Sea Lion Islands in order to haul up for Bull Road; or, if daylight allow, by making the Shag Rock they may run for Lively or Choiseul Sound.

**Bay of Harbors,** westward of Bleaker Island, is 11½ miles wide at the entrance between Driftwood and Porpoise Points, and extends 15 miles to the northwest, contracting to 1¾ miles between West and Cattle Points, and within them expanding again to 5 miles. Nearly midway, in the entrance, 4 miles 35° from Bull Point, is Middle Shoal, with a rock awash at low water.

**Bull Road,** in the southwest part of Bay of Harbors, is by far the most convenient anchorage in the southern part of East Falk-

land. Large sailing vessels can work into it, and by anchoring in 7 to 10 fathoms water, good bottom, close to the shore on the south side of the road, off the entrance of Bull Cove, the large kelp reefs on the north side of the point will completely shelter them from easterly winds.

**Water.**—Except during a very dry summer, there is fresh water in all the bights on the south side of the road; but the best watering place is in a cove on the western side, off which the anchorage is good.

**Directions.**—In approaching Bull Road care must be taken to avoid the kelp patches, indicating shoal water, 1½ miles southeastward of Porpoise Point; also the kelp patches extending 1 mile northeastward of Bull Point and Porpoise Island. Following the edge of the kelp to the northwest will lead into the road, and the chart and the kelp will be the best guides in this as in every part of the Falklands.

**Fanny Road,** formed by the Fanny Islands and West Point, is the only other advisable anchorage southward of West Point; it shows three beaches of white sand, and is secure, with a good depth of water, bottom of sand and mud. No direction is necessary except to look out for a small kelp patch ½ mile northeastward of Fanny Islands.

Large sailing vessels bound up the bay with a leading wind should keep a mid-channel course between Cow Point and Little Harbor Island to clear the kelp spit extending southeastward from Kelp Island. A course 314° for 5 miles will lead past West and Cattle Points and clear of three kelp patches which lie 1½ miles 311° from West Point.

**Snug Cove.**—Northwestward of West Point there is good anchorage for large vessels westward of the three kelp patches and southward of the cliffy point forming Snug Cove, in 8 to 15 fathoms, mud and sand; it is advisable to moor.

North and Northwest Arms and the several creeks offer to vessels of moderate tonnage secure and snug berths; the only direction necessary for entering them is to look out for the kelp extending off the points and islands, which is generally bold-to. Here, as in Adventure Sound, the hills seldom exceed 150 or 180 feet in height and have a uniform appearance. Fish and water are procurable.

**Tides.**—High water, full and change, in the Bay of Harbors is at 6h.; springs rise 5 feet, with little or no stream.

**Tidal streams.**—The tidal stream sets to the westward, during the flood, along the whole south shore of East Falkland; its strength is from 1 knot to 2 knots an hour, but near Porpoise Point, the southwest horn of the Bay of Harbors, it is nearly 3 knots, and with

westerly gales forms a strong race. The stream turns with high water by the shore.

**Eagle Passage,** situated between the southwest end of East Falkland and the islands Speedwell, George, and Barren, is not recommended for large vessels, as the tidal streams attain a rate of 3 knots an hour, with races in the narrow parts. Vessels in passing through may go on either side of the kelp patch which lies 1½ miles west-northwestward of Blind Island.

The only other obstruction in the passage is Mid Island with its reefs, marked by kelp, extending ¾ mile north-northwest and east by south from the island; the sea breaks heavily on them in bad weather, as it does on all the coast from Porpoise Point to Mid Island, after passing which the channel becomes narrow but clear of danger.

**Barren and George Islands—Owen Road.**—Of the group of islands that form Eagle Passage, George and Barren are the southernmost; the former is about 6 miles long, northeast and southwest, 2½ miles wide, and 50 feet high; the latter is about 4 miles long, east-northeast and west-southwest, 1½ miles wide, and 60 feet high; between them is Owen Road, which affords good anchorage for any kind of vessel.

To enter Eagle Passage from the southward, care must be taken not to pass Barren Island nearer than 3 miles, as the two barren reefs project northeastward fully 2 miles, and at 3 miles southeastward of the middle of the island there is kelp and foul ground. From the western point of George Island a reef projects about 3 miles to the southwest, with kelp extending 2 miles farther in the same direction.

The south channel from Owen Road, between George and Barren Islands, has been partially examined and is reported to be good; the least water obtained by the British war vessel *Dwarf* in passing through was 4 fathoms.

**Directions.**—Vessels entering Eagle Passage from the southward should not haul up for the anchorage in Owen Road until the passage between Barren and George Islands is open, or until the north point of Barren Island bears 227° and the north point of George Island 284°, then a course 238° will lead to the anchorage. There is a kelp-covered reef halfway between the eastern points of George Island and Barren Reefs; the passage recommended, which lies to the southward of it, is more than a mile wide and quite clear. The chart also indicates a reef projecting about 1¼ miles northeastward from a point in the southern part of George Island and nearly midway of the road.

With a southwest gale a vessel may work into Owen Road, as the water is quite smooth; and with a southeast gale, which causes the heaviest sea on the coast, she will ride in smooth water if the northeastern part of Barren Island bears northward of east. A good

position is in 8 to 10 fathoms water, close off George Island; the bottom is chiefly stiff clay covered with a crust of broken shells. Straggling stems of kelp will be seen, but they are of no consequence. Large vessels should anchor before shutting in the points of the southern passage.

**Water.**—These islands are well supplied with water from many lakes; the largest, on George Island, is nearly a mile in extent.

**Speedwell Island,** northward of George Island, is the largest of the group, being 9½ miles long, north and south, and about 3 miles wide; it is low and flat, about 70 feet high, and visible about 9 miles. Geese and snipe are plentiful on the island, and driftwood is abundant on the western shores.

**Anchorages.**—Speedwell Island has two good anchorages for small vessels on its northeastern side, where fresh water is procurable. Half-way Cove, the first of these anchorages, immediately southward of a small rock islet, is small, and a sailing vessel must be quick in coming to an anchor. There is kelp on both sides, but not less than 5 or 6 fathoms water on its edge; the holding ground is excellent, with depts of 5 to 8 fathoms.

The British war vessel *Swallow*, 1899, anchored in Half-way Cove in 6 fathoms water, with the extremes of the island, north of the cove, bearing 343° and 13°, and the southeast point of the bay 111°, with just swinging room between the kelp.

The other anchorage is about a mile within the north point of the island, in the first sandy bay seen when standing along the island to the southward. Care is necessary when approaching this anchorage from the northward, as shoal water extends about ½ mile from the northeast part of Speedwell Island.

Between George and Speedwell Islands there is a passage for small vessels, but it requires a good pilot, as there are some rocks in it. It is sometimes used by small craft in running for the southern anchorage of Speedwell Island. In making for either of the anchorages on the northeastern side of Speedwell Island from the northward keep about 2 miles northeastward of Elephant Cays and well clear of the kelp off the islet between them and Speedwell Island.

**Elephant Cays,** lying off the northwest end of Speedwell Island, are low, sandy islets, surrounded by reefs and kelp; there is no known passage between them and Speedwell Island. Kelp extends about 2½ miles northward of the cays, beyond which there is a detached patch of kelp, from which the west extreme of Elephant Cays bears 189°, distant 3½ miles; depths of 6 to 7 fathoms were obtained 2 miles northwest, and a spot which occasionally breaks, marked by kelp, lies 1 mile southwest of Elephant Cays. A wide berth should be given to them.

**Tides.**—High water, full and change, in Eagle Passage is at 8h.; springs rise 4 feet.

**Tidal streams.**—The flood stream sets through to the northward, and the ebb to the southward, with velocities of 2 to 3 knots an hour, but greatly influenced by the winds.

## FALKLAND SOUND.

**Falkland Sound,** which separates the two main islands, East and West Falkland, from each other, is about 50 miles long, northeast by north and southwest by south, and in width varies between 2½ and 13 miles. At its southern end there are many flat islands and some shoals; the dangers are, however, generally visible. The water being always smooth and thick weather seldom occurring, its navigation is rendered easy; it is neither prudent nor necessary to navigate through it at night, as good anchorages may be obtained in almost any part and a safe position selected before dark.

The eastern side of the sound, after passing the Northwest Islets and Grantham Sound from the northward, changes its aspect and is a low country, with gently undulating hills, which seldom exceed 150 feet in height, maintaining this character to the southern extremity of the sound. Its shore is indented with excellent harbors and creeks, affording good shelter in all weathers, and is fronted with flat islands, particularly in the southeast part.

The western side, on the contrary, high and bold, is formed by a singular ridge, from 300 to 600 feet high, nearly the whole length of the sound, but reft asunder in places and thus forming harbors. From Bold Point northward it is a continuous ridge, lowering gradually to White Rock Bay and separated midway by the entrance to Many-branch Harbor.

These gaps or fissures, in the southern portion of the sound, form excellent guides to the opposite harbors and islands on the flat side of the sound, the positions of which can be determined by bearings of these marks. Immediately behind the ridge above mentioned Hornby Mountains extend in a parallel line as far as Hill Gap, whence they take a westerly direction, ranging from 1,800 to 2,000 feet in height.

The ports in Falkland Sound need but few written directions; the shoals are all buoyed by kelp, and the chart is the best guide. The harbors on East Falkland will be first described, beginning from the north.

**Foul and Middle Bays,** lying between Cape Dolphin and Race Point, offer no inducement to enter, both being lee-shore bays; the first, encumbered with shoals, has a shallow harbor in its bight, but

with a shifting sand bar, it is very difficult to enter, and is only suitable for small craft.

**Port San Carlos,** one of the finest harbors in the Falklands, is capacious, secure, and clear of all danger. Anchorage may be obtained either in the bay northward of the long tussac islands or in the south or east arm. The San Carlos River is navigable for small vessels for 3 or 4 miles, and for boats about 6 miles. Careening Cove, 2 miles within the entrance point of the east arm, is a good place for beaching a vessel. Steamers from New Zealand sometimes call here for carcasses of sheep, and it is stated that a small supply of patent fuel is kept for their use.

**Settlements.**—There are two settlements, one in Careening Cove and the other on the east side of the south arm; fresh mutton may be obtained, wild geese, snipe, and teal shot, and an abundance of fish caught in the river in the season; heath fuel may be procured.

**Tides.**—High water, full and change, in Port San Carlos is at 7h. 0m.; springs rise 8½ feet.

**Port Sussex,** in Grantham Sound, is a snug and good harbor for small vessels; the best anchorage, in 4 or 5 fathoms water, stiff mud, is beyond the flat, stony point, on the southern side, about 1½ miles inside the entrance; but the British war vessel *Barracouta*, 1895, found less water than charted. Good water may be obtained, and it is an excellent port for careening or refitting. There is a small kelp patch off the east point of the entrance of the harbor, with a depth of 4 fathoms, which must be avoided by keeping near the west point.

**Tides.**—High water, full and change, in Port Sussex is at 8h. 15m.; springs rise 6 feet.

**Brenton Loch,** southward of Port Sussex, has a narrow entrance and strong tidal streams; its navigation is impeded by several rocks and shoals, and it is therefore available only for small vessels or boats. It is admirably sheltered, affords a water communication 8 miles in length from the center of the island to the sea, and nearly joins Choiseul Sound, from the head of which it is separated by a narrow neck of land little more than a mile in width.

**Newhaven,** on the south side of Grantham Sound, is a little port well suited to small vessels, with good anchorage in 4 to 6 fathoms water, stiff clay under a surface of sand. It is open to the northwest, but little sea sets in. Anchorage should be taken up toward the western shore, near a small cove, about a mile from the outer point.

**Cygnet, King, Wharton, and Findley Harbors** are situated eastward of the Tyssen Islands; all are excellent and secure, particularly the last three, which have no shoals in them of any consequence. Cygnet Harbor has several small kelp patches that would inconvenience a square-rigged sailing vessel in working in, but is a capital harbor for small vessels.

The bay on the eastern side of Great Island affords good anchorage in 12 to 15 fathoms water, and is a convenient starting point for vessels bound southward.

**Ruggles Bay** lies abreast the Calista Islands, with entrance between Ruggles and Wolfe Islands. Good anchorages may be obtained at the head of the bay, in Danson and Moffit Harbors, which are clear of danger.

**Tides.**—High water, full and change, in Port King and Wharton Harbor is at 8h. 30m., and in Danson Harbor at 7h. 30m.; springs rise about 5 feet.

**Western shore of the sound.**—Returning now to the northern end of the sound, the several ports which lie along its western shore will be briefly described.

**White Rock Bay** is an excellent port, about 2 miles in length by about 1 mile in width, and can be entered or left by sailing vessels with any wind, but care must be taken to avoid the rocks off the entrance. Strangers entering it from the northward with a foul wind should work up on the eastern shore of the sound, near Race Point, until they can weather Tide Rock, in the middle of the passage, when they may stand across into the bay.

If leaving the bay and bound to the northward with a northerly wind, they should stand across, passing on either side of Tide Rock, and work out on the east shore in order to keep clear of Sunk Rock and the rock awash off White Rock Point. The latter rock is surrounded with kelp, which shows only at slack water, being run under by the tidal streams.

With a fair wind a vessel may run in or out close past the large White Rock at the extremity of White Rock Point. Whether bound through the sound or into White Rock Bay, should a vessel have to wait outside for the change of tide to enable her to work to the southward, she should keep a little to the westward of the entrance, under easy sail, where there is scarcely any stream.

**Many-branch Harbor** can only be sailed into by fore-and-aft craft, in consequence of the narrow and crooked entrance between its high heads, which flaws the wind in all directions. For large square-rigged vessels warping or towing must be resorted to in the morning or evening, when the wind is generally moderate. It is a good harbor.

**Tides.**—High water, full and change, in Many-branch Harbor is at 7h. 40m.; springs rise 7½ feet.

**Port Howard** has also a narrow entrance, but the harbor opens out immediately inside the heads, and a sailing vessel with the wind to the southward or west would shoot well in by keeping close around the south head. With a northerly wind a square-rigged vessel would

scarcely succeed, and should anchor outside in 11 or 12 fathoms water, waiting there for the morning and evening calms.

The harbor is narrow, but very secure; the best anchorage for large vessels is just inside the heads, in 4 or 5 fathoms water; good holding ground. Williwaws are very strong with winds off the western shore.

**Settlements.**—On the west side of the North Arm, at the entrance of a small inlet, there is a settlement and station for boiling down oil, which has a small pier abreast it; a shoal with a depth of 14 feet extends from the pier about one-third way across the harbor. Another settlement is situated at the head of the North Arm. Geese, fish, and a plentiful supply of good, fresh water may be obtained.

**Tides.**—High water, full and change, in Port Howard is at 7h. 0m.; spring rise 5 feet.

**Shag Harbor,** 5 miles southward of Port Howard, is suitable for small vessels only; the gusts of wind down the ravine are very violent, but the holding ground is excellent. There are settlements on each side of the arm that stretches westward from the harbor.

Good anchorage may also be obtained between Swan Islands and West Falkland.

**Fox Bay** is wild and exposed, with south winds to a heavy sea, but should a vessel be caught there, a good retreat is in North Arm, which is quite secure. A Government medical officer, who is also postmaster, is stationed in Fox Bay.

**Settlements.**—There are settlements on both sides of North Arm, about ½ mile above the first flat island. Abundance of fish may be caught, with a good beach for hauling the seine.

**Anchorage.**—The passage to North Arm is between the kelp, always visible, which extends from each side, but principally from the eastern. The channel is between Knob Island and an isolated kelp patch about 800 yards east of it. A secure berth will be found in 3 or 4 fathoms water, stiff mud with the first flat island inside the Narrows, bearing south, distant 600 yards. This inner harbor is small, and can be entered by square-rigged sailing vessels only with a fair wind.

**Tides.**—High water, full and change, on the shore at Race Point, at the northern entrance of Falkland Sound, is at 6h, 45m.; at the southern entrance of the sound, at 7h.

**Tidal streams.**—The velocity of the tidal stream at Race Point is about 4 knots an hour, but in Grantham Sound the rate diminshes to about 1½ knots.

The tidal streams in both entrances of the sound, and between the islands, run 3 to 5 knots at springs, but in the wider portions they are moderate. The stream of tide at the north entrance makes into

the sound about 3 hours before high water on the shore, or about 4 hours at full and change. Among the islands in the southeastern part of the sound the streams are very irregular in their set and velocity.

There appears to be tide and half tide all through Falkland Sound. The flood stream begins to run northward when it is half ebb by the shore, and runs until half flood; the stream then turns and runs southward until it is half ebb again. But the tides among these islands require further investigation. Capt. Fitz Roy states that the tide flows into both ends of Falkland Sound, and that the two streams meet near Swan Island.

**Mid-channel.—Sunk Rock** lies nearly midway between White Rock Point and Race Point. One mile to the southward is Tide Rock, 5 feet high, with a rock awash to the southward of it. One mile to the northwestward of Sunk Rock is a rock awash at low water.

**Swan Islands,** consisting of North Swan, Swan, and West Swan Islands lie eastward, southeastward, and southward of Shag Harbor, respectively. North Swan Island, about 1 mile long, north and south, and ½ mile wide, is separated from Swan Island by a shoal of rocks with no passage between them. West Swan Island, about 2 miles long, north and south, and ½ mile wide, lies midway between Swan Island and West Falkland Island, distant ½ mile from each. There is a narrow passage between West Swan Island and West Falkland Island, not recommended, however, owing to a shoal and a reef of rocks extending from the southern extremity of West Swan Island, to the westward. Between West Swan Island and Swan Island there is a narrow passage called Swan Passage, with 5 fathoms least water.

Tyssen Islands are a group of islands about 4 miles southward of Swan Island, lying northeast and southwest of one another, and with Tyssen Patch, a shoal of rocks about 2 miles in extent, northeast and southwest, to the southwestward of Tyssen Islands, extend for a distance of 6 miles in the direction of the sound abreast Port King.

**Directions.**—The two ports in Falkland Sound most easy of access to vessels from East Falkland are White Rock Bay at the north entrance and Fox Bay at the south entrance. There is a little good grassy land near White Rock Bay, though quite cut off from the central valley; but Fox Bay, though not a good port for large vessels, has a safe anchorage for small ones in the head of the cove in the northwest corner, and a break in the hills would admit of an easy road to the center of the island. Vessels bound there from Port William would have sheltered anchorages all along the south side of East Falkland and through Eagle Passage.

**From the northward,** entering Falkland Sound, steer for Fanning Head, the high double peak on the eastern side of the entrance,

or, if it be obscured, make a 187° course from the Eddystone Rock until within a couple of miles of Race Point, when the eastern shore must be kept aboard to avoid Tide Rock and the rocks westward of it. Tide Rock is about 5 feet above water, steep-to, and forms a good guide to avoid the others by keeping it bearing westward of 209°.

The soundings from the Eddystone Rock to the entrance of the sound are fairly regular, over a bottom of fine black speckled sand. Off Race Point there is a ledge, which does not, however, extend beyond 200 yards from the point; thence to Fanning Head the shore is clear.

If the wind and tidal stream are both adverse, it is advisable for a sailing vessel to keep close under the lee of West Falkland until the tide turns.

From abreast Fanning Head a course 206° for 8 miles from White Rock Bay will bring the vessel to the Northwest Islets, Grantham Sound, where the high land of East Falkland terminates; thence a 215° course for 14 miles will lead to abreast of High Cliff Island, which, though small, is the highest in the sound, being nearly 100 feet high. It is remarkable for its white cliff, somewhat discolered by birds, and is first seen from deck when abreast of Grantham Sound. Afterwards will be seen the low and flat Swan Islands lying in the middle of the sound.

**Main Passage** is between High Cliff and Swan Islands. After rounding the southeast point of Swan Island, borrow on West Falkland to celar Tyssen kelp patch, which has depths of 4 to 5 fathoms close to its edge. A good leading mark to clear this patch from the southeast point of Swan Island is a horizontal line of white sand deposited in the ridge of West Falkland, bearing 233°.

This leads 1½ miles northwestward of the patch and close to a patch of kelp, about 30 yards in extent, at 1½ miles from the western shore, with the south extreme of Swan Island bearing 59°, distant 8¼ miles, and West Island 208°. The course from between Tyssen Patch and West Falkland is about 199° to pass eastward of West Island.

**Swan Passage.**—In many cases it may be more advantageous to pass west of Swan Island; the Swan Passage is straight and clear, the water is smoother, and near it there is better anchorage than in the Main Passage, where, with a strong gale against the tidal stream, there is a heavy race.

**Anchorages.**—In both passages the stream is too strong for a sailing vessel to get through with a foul wind, and in this case, or if stopping for the night, the best anchorage, if bound to the southward, is near the north end of West Swan Island, and if bound to the northward, in the corner between West Swan Island and Hill Gap, avoiding the shoals. There is a passage between West Falkland and West Swan Island for small vessels only.

**Oberon Patch,** about 30 yards long, 10 yards wide, and marked by kelp with 10 fathoms around it, lies about 1½ miles southwestward of Swan Passage. From the patch, Hill Gap bears 347°, and the east end of Swan Island 75°. The west point of Swan Island in line with Poke Point, bearing 38°, leads just clear to the southeastward of Oberon Patch.

**Tyssen Island Passage.**—The passage eastward of Tyssen Islands to the several harbors of East Falkland is clear and good, the narrowest part being to the eastward of Sandbar Island, but even here it is rather more than a mile wide, with a good outlet to the Main Passage, around the north point of Great Island. The only shoals are the spit extending 800 yards southeastward from Sandbar Island, and that 400 yards northeastward from Great Island. The tidal streams frequently sweep the kelp on Sandbar Spit under water; it must, therefore, be carefully avoided.

There is a channel for small vessels, named Tickle Pass, between the southeast part of Great Island and the next island to the southeast. It is very narrow and through it the tidal streams run rapidly, but the least water is 6 fathoms; it is not recommended.

**Callista** and **Wedge Islands** lie in the center of the sound southwestward of Great Island. The channel is clear on both sides of them, but rocks and kelp extend for about 4½ miles in a northeast and southwest direction.

**Wood Shoal,** the center of which is located about 9 miles westward of Elephant Cays, is nearly circular, with a diameter of about 2 miles. The soundings on its northern edge are regular from 13 to 16 fathoms, with straggling kelp beyond. The reef is well marked by thick kelp, and the least water found was 11 fathoms; but having been seen to break during southerly gales, it may be much shoaler in some places; and as thick patches of kelp always indicate danger, it had better be carefully avoided. At times the kelp is not seen in passing, when probably it is underrun by the tidal stream.

**From the southward,** entering Falkland Sound, after passing Wood Shoal, which is about 5 miles from the shore of West Falkland and marked by kelp, keep at a moderate distance from the West Falkland Shore, and then the converse of the above directions will be a sufficient guide for any vessel. With northerly and northwest wind, a passage to the northward is sooner effected through the sound, as the water is always smooth, than by proceeding round by the east coast.

Sailing vessels at either extremity of Falkland Sound intending to proceed to sea, should the day be at all advanced, would do well to anchor for the night and start at daylight, as in this way they have the whole day to get clear of the entrances, and thus save some anxiety and risk, as the wind generally becomes light after sunset.

Good starting ports from the northern entrance are Port San Carlos and White Rock Bay; and from the southern, Anchorage Bay, on the east side of Great Island, and Ruggles Bay, anchoring, in the latter case, well into the southeast corner, toward Danson Harbor, as the ground is hard near the entrance.

As vessels are most likely to have recourse to Ports Edgar and Albemarle when making this group of islands from the southwestward, the information concerning them will be found in the description of the West Falkland Island.

## WEST FALKLAND.

**Tamar Harbor** is the first port on the north coast of West Falkland, westward of the north entrance of Falkland Sound, but it is not advisable for any stranger to use it. Tamar Pass, the entrance, is very narrow, and a reef extends nearly halfway across from the west entrance point. The kelp on this reef is run under by the extreme strength of the tidal streams, and the eddies are very dangerous.

There is also a kelp patch, which shows at slack water, in the center of the channel between the outer and inner entrance; but the least water found there was 3 fathoms, and the sealing vessels never avoid it. The tidal streams sweep through so rapidly that a vessel wishing to bring up in Tamar Harbor must haul out of the stream very quickly to prevent being carried through into Pebble Sound.

Small vessels, when well acquainted with Tamar Pass, may find it very useful to pass through it into Pebble Sound, if bound to the westward, thus having smooth water and good anchorage all the way to Port Egmont; but the northwest pass out of Pebble Sound is almost equally dangerous, being only 200 yards wide, with furious tidal streams; nothing but a small, quick-working sailing vessel should attempt to work through it.

**Tides.**—High water, full and change, in Pebble Sound is at 8h. 45m.; springs rise 8 feet.

**Tidal streams.**—Running to the westward along the north coast of the islands, part of the flood rushes through Tamar and Whaler Passes, and part sweeps around the West Pebble Islet into Keppel Sound, filling that sound and Port Egmont 2 hours before it has ceased running to the westward.

This latter portion rushes eastward through the Northwest Pass at rates of 5 to 8 knots an hour, sweeps through a part of Pebble Sound, meeting the stream of the flood that comes in with equal velocity through Tamar Pass, and thus causes whirls and eddies in several quarters. The water having attained its height remains quiet only a little while, and then ebbs with similar fury.

From the westward, if found through Northwest and Tamar Passes, the time should be chosen so as to run into Northwest Pass with the flood and out of Tamar Pass with the ebb.

**Elephant Bay.**—There is no good anchorage on the north side of Pebble Island, but with the wind offshore temporary anchorage may be found on the west side of Elephant Bay, though very much exposed if the wind should haul to the northward. The peaks on Pebble Island, 700 to 900 feet high and seen very clearly when coming in from the northward, are the best marks for making out this part of the coast.

**Settlement.**—There is a settlement on the southwest side of Elephant Bay, and about a mile north of this is the Admiralty Reserve.

**Pebble Sound,** southward of Pebble Island, is about 15 miles long, 9 miles wide, full of islands, and has good anchorage in every part. The islands are low and, except Golding and Middle Islands, not well supplied with water through the summer. The Warrah, one of the largest streams in the Falklands, runs into the south side of this sound, and at high tide boats can go up into the fresh water.

Besides Tamar Pass and Northwest Pass there are among the islands two other passages into Pebble Sound—Anxious Pass, between Golding and Passage Islands, and another very narrow one to the southward of all the islands and close to Creek Point; but the approaches to them are so intricate that they are not likely to be used except by coasting vessels. The chart is the only guide to them, for the kelp, as in the other channels, is always run down by the tidal streams. They are not recommended.

**Settlement.**—There is a settlement at River Harbor, about 2 miles southward of Middle Island.

**Port Egmont Cays.**—Two islands surrounded with rocks and kelp to the distance of ½ mile extend 5 miles west-northwest from the west point of Pebble Island, and 3 miles farther westward are Port Egmont Cays, of a similar nature.

**Wreck and Sedge Islands,** each about 2 miles in length, east and west, are 4½ miles apart; the space between the islands is thickly studded with rocks and kelp, visible at half tide; the reef also extends nearly 1 mile northward of Wreck Island.

Wreck Island is low, and from the southward makes as three low islands; it lies 6 miles 27° from Elephant Point, the west point of Saunders Island, and must not be mistaken for Port Egmont Cays; it should be left to the westward in passing.

**Rock.**—A rock has been stated to lie 137°, distant 1 mile, from the southwest end of Sedge Island, in the direction of Elephant Point, but its existence is considered doubtful.

**Keppel Sound** is between Keppel Island and the west end of Pebble Island. From Reef Point, the northeast point of Keppel Island, a reef marked by kelp extends off about 1½ miles; care is required in rounding it. South of Reef Point is Committee Bay, in which is Cranmer Mission station; immediately to the northward are the Admiralty Reserves.

**Supplies.**—Cattle, sheep, rabbits, and vegetables may be procured.

**Anchorage.**—The anchorage off the mission is good, but vessels of 14 feet draft should not go inside a line joining the north and south points of the bay.

**Port Egmont,** in which was the old settlement of which the houses are not now easily distinguished, lies southward of Keppel Island, between it and Saunders Island, and affords good anchorage in every part. The tidal streams are not strong. The north and usual entrance, between Saunders and Keppel Islands, is nearly a mile wide and clear of danger; but it would take a very fast sailing vessel to work through against the tidal stream.

**Anchorage.**—The best anchorage is off Old Settlement Cove, close to the southward of a kelp patch, or in Sealers Cove, a little farther to the southwest, which is better sheltered from southerly winds. Here there is a settlement and a rough pier.

**Reef Channel** is narrow and winding and leads from the south side of Port Egmont into Burnt Harbor and through it to the head of Byron Sound; but it is not suitable for large vessels.

**Supplies.**—On Saunders Island ducks and geese are plentiful. Good water is readily obtainable.

**Directions.**—Vessels bound to Keppel Sound and Port Egmont from the northward should endeavor to make the high land of Mount Harston, 1,365 feet high, on the western peninsula of Saunders Island, which will be seen in clear weather long before the lowland of Sedge and Wreck Islands, which lie about 6 miles to the northward.

Passing between Wreck Island and Egmont Cays, the entrance to port Egmont will be plainly seen. There is a clear passage on either side of Egmont Cays, and between them and the entrance of the port there is no danger except a small kelp patch off the entrance, about 1¼ miles northwest of Gull Point, which always shows.

The passage into Keppel Sound is between the reef off North Point and that extending from Keppel Islet. A passage leads from the sound into Port Egmont, around the south side of Keppel Island, which is quite clear of danger and well marked by kelp; but it would be used only by vessels that had passed through Pebble Sound.

**Tides.**—High water, full and change, in Port Egmont is at 7h. 30m.; spring's rise 11 feet, making it the best place in the island for

beaching a vessel. Old Settlement Cove is well adapted for this purpose.

**Race Rocks** lie 1¼ miles northwestward from Elephant Point, the northwest extreme of Saunders Island. At 1 mile northward of them is a patch of 4 fathoms, generally marked by a tide rip.

**Rock.**—A rock lies 297°, distant 3½ miles, from Race Rocks, but does not show, and any kelp that may mark it is generally swept under by the tidal streams.

**Breet Harbor,** on the west side of Saunders Island, is of little service; it has a long, narrow entrance, and is shoal, with reefs and kelp patches.

**Carcass Island,** the largest of a chain of islands, extending northwestward 16 miles from the southwest point of Saunders Island, is easily distinguished by the double peak in its center, 860 feet high. Off the northwest end lie two islands named the Twins; off the southeast end are the Needles Rocks and Low and Dunbar Islets; and off the southwest side is Carcass Reef, a narrow ridge about 1½ miles long. A hummock east of Low Island is green capped and a good mark when passing west of Dunbar Island.

**Settlement.**—There is a settlement on the north shore of a bay on the south side of the island, and here anchorage may be obtained, but it is not advisable to go beyond the line joining the entrance points of the bay.

**Byron Sound,** southward of Saunders Island, is much exposed to westerly gales, which send a heavy sea up to its head; but there is good anchorage for small vessels in the southeast corner, in the entrance to Hill Cove; the cove itself is not recommended, as a shoal is reported to exist just inside the two kelp patches in the middle of the entrance. There is a settlement on the southwest side of the cove.

**Burnt Harbor,** formed between Burnt Island and the south side of Saunders Island, is the only good anchorage at the head of Byron Sound, and has on the north side a good watering place; but a long reef in the western entrance forms two narrow channels, through which only a small sailing vessel can work. There is a very narrow channel round the east end of Burnt Island, but suitable only for coasters. The south side of Saunders Island abounds in rabbits.

**Hope Harbor** is situated at the northwest point of West Falkland. There is a bank to the northward of the entrance, on which not less than 5 fathoms water could be found, and a shoal, with a depth of 3 fathoms, on the south side of the harbor and east of the entrance to Westpoint Pass, or, as locally known, Wooley Gut.

**Settlement.**—There is a cove on the northeast side of Westpoint Island, with a large kelp patch off the entrance, but with not less than 8 fathoms water on any part of it. Should a vessel intend re-

maining for a few days, this cove, in which there is a settlement, is the best place to choose, as it is not exposed to the heavy squalls off the island, which rush up Hope Harbor. Rabbits are abundant on the island.

**Anchorage.**—Vessels should anchor off Grave Cove, on the south side, where there is a good watering place. At the head of the harbor is a stream in which, at spring tides, quantities of fish may be taken.

**Gibraltar Reef,** an extensive ledge covered with kelp, extends 7½ miles west-northwest from Cape Terrible, the northwest point of Westpoint Island. White Rock is situated about 2 miles within the extremity, and Gibraltar Rock, 280 feet high, about 1½ miles from the cape; the reef does not break in fine weather.

The tidal streams run directly across this reef, and it is to avoid the risk of being set toward it that vessels bound to Hope Harbor are enjoined to pass to the eastward of Carcass Island.

**Directions.**—Vessels from the northward, bound to Hope Harbor or to any of the ports southward of it, should avoid getting to the westward of Carcass Island, between which and Jason Islands are several reefs, the kelp on which is run under by the tidal streams. But from Sedge or Wreck Island to the east end of Carcass Island the only dangers are the foul patch, with 4 fathoms water, about ½ mile northward of Race Rocks, and the patch, already mentioned, 3½ miles westward of them. Sloop Rock, about 1½ miles east of Hope Point, is quite white and most conspicuous.

With a strong breeze there is a heavy race for nearly a mile west of the 4-fathom patch, but by giving it a berth of a full mile, which all vessels should do, there will be no danger, and a direct course may then be steered for the Needles Rocks or for the eastern end of Carcass Island.

The passage eastward of the Needles is the best, as these rocks may be almost touched; thence to the entrance of Hope Harbor there is no danger but what shows well above water; though sailing vessels may have to make two or three tacks to reach the harbor, this is much better than to pass between the reefs northwest of Carcass Island, with the chance, if the wind fail, of having to anchor to avoid being swept through between the Jason Islands and Westpoint Island.

Nor is there any well-sheltered anchorage there, if it should be necessary to wait for the tide; whereas, by steering to pass eastward of Carcass Island, good anchorage will be found in 7 to 12 fathoms in the bay at the eastern end of that island, except with northerly winds, when vessels may anchor off the bay on the south side, to the northeastward of Carcass Reef.

**Caution.**—When entering Hope Harbor, Hope Point should not be passed nearer than 200 yards, as the kelp is underrun by the tidal

streams, and no sailing vessel can enter against the stream, except with a good leading wind. If the wind be between northwest and southwest it would be useless to attempt to leave through Westpoint Pass, the southern channel, against the tidal stream, as the wind would be baffling; but a vessel might anchor in the entrance of the cove in Westpoint Island and wait here for slack water.

There is said to be a considerable race between Hope Point and Westpoint Island, especially during and after bad weather.

In passing to the northward through Westpoint Pass, it is necessary to wait for the tide unless the wind should be to the southward of southwest, and even then it may be difficult to get through the northern part of the channel. Should this be the case, a vessel ought to bring up in the entrance to Hope Harbor, out of the stream of tide, and wait until slack water.

A vessel bound from Hope Harbor to the northward should also pass to the eastward of Carcass Island and the Needles Rocks and eastward of Wreck Island, thus avoiding all the reefs and tide rips to the westward and northwestward of Carcass Island and the Twins.

Should it be necessary to pass to the westward of Carcass Island the best passage is just westward of the Twins and southward of the rock, which always breaks, lying 2½ miles north-northwest of Carcass Island. Westward of this rock there are some reefs, the kelp on which shows only at slack water, and vessels should cautiously avoid them, as no clearing marks can be given.

**Tides on north coast.**—High water, full and change, in Hope Harbor is at 8h. 10 m.; springs rise 10 feet; slack water in the passage is not until 10 hours, or about 2 hours after high water.

**Tidal streams.**—The flood stream sets strongly around the west end of Carcass Island toward Gibraltar Reef and also through all the passages into Byron Sound, but there is very little tidal stream in that sound, nor is a vessel sensibly affected by it until as far west as Carcass Reef. There the flood stream will be found setting very strongly toward Hope Harbor and through it to the southward. The ebb, or eastern stream, sets from Hope Harbor toward both ends of Carcass Island and through the channel east of the island to the northward, but likewise is scarcely felt in Byron Sound.

The flood stream sets to the westward along the north side of West Falkland for about two hours after it is high water in Port Egmont. At springs it runs nearly 3 knots an hour off the points and around the islets, causing strong tide rips in heavy weather.

After passing the northwest point of Saunders Island it runs to the southwest between Carcass Island and the islets near it and through all the channels between Westpoint Island and the several Jason Islands. Here again the tide and half tide occur nearly as in Falkland Sound, for, meeting the tide wave from the southward around

the western islands, the last 4 hours' flood and the first 2 hours' ebb run to the northeastward.

**Jason Islands** form a chain extending northwestward 38 miles from Hope Point, the northwest point of West Falkland. Jason West Cay, at the extremity of the chain, is low and less than a mile long. Jason East Cay is of a similar nature. Steeple Jason and Grand Jason are lofty, the former being 1,050 and the latter 1,210 feet high. Inshore of these lie Flat, Elephant, and South Jason, the last two, respectively 540 and 810 feet high.

South Jason has a ledge, named Hope Reef, extending 4½ miles northeastward of it; the space between this reef and Carcass Island is full of ledges and tide rips. The passages between these islands are little known and should be avoided; those between Flat Jason and Westpoint Islands are full of dangers, across which the tidal streams set violently, especially across Gibraltar Reef.

Westward of Flat Jason the passages are clearer; should the tidal streams, in light winds, set a vessel toward them, by keeping near the middle of the passage she will be taken through clear; but having passed in this manner to the southward, between Grand and Flat Jasons, care must be taken that, on the turn of tide, the vessel be not swept toward the South Jason and the reefs off Westpoint Island.

**Kelp.**—Mr. C. Hansen, master of the schooner *Foam* (1890), reports having passed through a patch of kelp about ½ mile in extent northward of Jason Islands; the wind at the time was northeasterly, with a rough sea, but no breakers were seen. From the patch the west end of Steeple Jason bore approximately 165° distant 7 to 8 miles. It was estimated to be slack water when the *Foam* passed through the kelp, which would be under water, it was thought, with the tidal stream running, as it attains in this locality considerable velocity.

**King George Bay,** separated from Byron Sound by the long, remarkable West Falkland Peninsula terminating in Hope Point, is of rectangular form and great extent, being 21 miles long and about 10 miles wide, with general depths of 25 to 40 fathoms. Several bays and harbors are included within its limits. In the middle of the main entrance, between Deaths Head and the Passage Islands, lies Split Island, 500 feet high, the passage on either side being wide, deep, and clear. The different openings through the Passage Islands show plainly.

**Port North,** a deep bight on the northern shore of King George Bay, with 10 to 16 fathoms of water, is exposed to westerly and southwesterly gales. There is a valley with a good stream at the head of the port. In Bense Harbor, between the two Bense Islands and the mainland near Pickthorne Point, which separates Port North from

King George Bay, there is good anchorage for small vessels; a clear passage runs through it.

**Hummock Island,** 610 feet high, is the best guide in running up King George Bay; its peak forms a cliff on the north side and slopes to the southward. Halfway between Bense Harbor and Hummock Island stands Rabbit Island, the west side of which is a high and conspicuous cliff; about 1½ miles to the southwestward is a kelp patch. Some rocks south of Rabbit Island are locally known as Lion Islets from their resemblance to two crouching lions facing each other.

Between Rabbit and Hummock Islands is a chain of small islets, through which are three good passages; one is close to the south point of Rabbit Island, and the other two lie on each side of the islet nearest to Hummock Island. All are clear of danger, but the tidal streams set rapidly through them, and a vessel should endeavor to keep nearly in mid-channel.

**Whaler Bay,** in the corner northward of Rabbit Island, offers a safe and good anchorage, with coves for small craft and good watering places. The narrow channel between Rabbit Island and the mainland into this anchorage is scarcely available for the smallest vessels, being very narrow, with strong tidal streams. The bay is a good place for fish and a weir has been built at its head by the sealers.

**Tides.**—High water, full and change, in Whaler Bay is at 9h. 0m.

**Roy Cove,** on the north shore of King George Bay, abreast of Hummock Island, is a very secure and deep creek, in which there is a settlement. The cove is a good place for beaching small craft, as the rise and fall of tide it 10 feet at springs, and being deep close to the rocks, it answers also for heaving down a vessel.

**Christmas Harbor** is an inlet at the head of King George Bay, and Chartres River, which falls into it and on which are two settlements, leads to the center of West Falkland. There are several creeks, and the large fresh-water streams run through some of the best watered land in the whole group.

The entrance to the harbor, near Town Point, is about 1 mile wide. After a vessel has passed Hummock Island the point appears as if covered by scattered houses, this appearance being caused by numerous patches of white sand spread over the side of the hill above the point. Middle Island, 415 feet high, and the smaller one eastward of it, may be passed on either side, and there is good anchorage within them, off the mouth of the harbor.

A long narrow reef covered with kelp lies in the entrance of the harbor and forms two channels. The southern is suitable only for small craft, there being 2¼ fathoms at low water on a bank which extends from the west end of the reef to Town Point, but the channel

northward of the reef is clear, with a depth of 4 fathoms as far as Tide Islet, small and green, abreast of which is the best anchorage for large vessels.

Nearly 1 mile above Tide Islet, where the harbor widens, a bar extends across the harbor, over which the deepest water, 2½ fathoms, lies near the south shore; but in mid-channel, and thence to the north shore, the depth is only 3 feet, and this shallow water, having a sandy bottom, is not marked by kelp.

The best guide is the kelp on the south shore, which should be left about 400 yards distant until the water deepens to 4 and 6 fathoms, whence for 2 miles there is good anchorage in that depth.

**Water.**—There are several good streams of water in different parts of this harbor, but the easiest for vessels is that marked on the chart, on the south shore, nearly abreast Tide Islet.

**Tides.**—High water, full and change, in Christmas Harbor is at 9h. 5m.; springs rise 11 feet.

**Passage Islands.**—King George and Queen Charlotte Bays are separated by a long narrow strip of land terminating in Dunnose Head, in continuation of which are the four Passage Islands. East and Whale, the two eastern passages through these islands, are very good and clear of all danger. The tidal streams set directly through them, turning at about half flood and ebb by the shore. The third, West Passage, is narrow, but can be used by a sailing vessel with a leading wind. The fourth, False Passage, is completely blocked by kelp.

At ¾ mile northwestward of Fourth Island is a kelp patch, with a depth of 14 fathoms between it and the island; there is a tide rip here with strong breezes.

Passage Islands are steep-to, and all outlying dangers show plainly. Round Island and the Sail Rock near it are good marks for Whale Passage, the easiest passage for sailing vessels, but with a foul wind it would be always necessary to wait for the tide.

**Anchorage.**—There is no good anchorage near the islands, but vessels detained by a southerly wind or caught in a southerly gale might anchor under the lee of Dunnose Head, near the entrance of Rous Creek, a small cove in which there is water for vessels drawing 14 feet; and vessels, if damaged, might safely make for this cove and run on the sand at its head; the cove is well sheltered, and the water always smooth. On the south side of Dunnose there is no safe anchorage short of Philomel Road, about 10 miles southeast of that headland.

**Queen Charlotte Bay.**—This extensive bay, 10 miles wide at the entrance, between Dunnose Head and Swan Point, is mostly clear of shoals and possesses several good harbors.

**Philomel Road.—Shallow Harbor,** in the northwest corner of Philomel Road, is the first anchorage on the north side of Queen Charlotte Bay and may be easily known in coming from the wesward by the steep bluff about 2 miles westward of it. When abreast this bluff Green Island, which lies off Philomel Road, will be plainly seen. This small island may be passed close-to on its south side; and a vessel can then haul up directly into the road, on the north side of which lies Shallow Harbor.

The chart, and a lookout for kelp, of which there are several patches, will be better guides than any directions. The small islet in the entrance of the harbor may be passed on either side, but if to the westward care should be taken not to pass too close to Shallow Point, on the mainland, off which shoal water extends 200 yards outside the kelp. All other dangers are marked by kelp and can easily be avoided.

There is a narrow channel into Philomel Road northward of Green Island, across the kelp reef which extends a long way northward of the island and nearly joins the kelp off Dick Point; also a narrow clear channel near the point, through which the depth is 6 fathoms; it is perfectly safe with a leading wind, but requires a good lookout from aloft.

**Port Philomel.**—At the northeast end of Philomel Rock a narrow channel, nearly 6 miles long, leads to the large landlocked harbor of Port Philomel, but the tidal streams are so strong in this channel that sailing vessels must be small and quick working to attempt it, particularly the Narrows between the two small islands at its inner end; there is, however, a small bay on its north side below these islands, named Halfway Cove, in which the anchorage is excellent and out of the tidal streams. Vessels bound through should anchor here, even if going up with the stream, and await slack water to shoot through the Narrows.

So great is the area of this splendid harbor that the entrance is not sufficiently large to admit the water as fast as it rises outside; consequently it is high water inside 2¾ hours later than in Philomel Road and Shallow Harbor, and rises 2 feet less.

When inside the Narrows, there is no danger in any part of Port Philomel except what is marked by kelp; the anchorage is excellent in every part, in depths of 7 to 10 fathoms; in all the creeks there is good anchorage for small craft in 2 to 4 fathoms. The surrounding shores of the port are well watered except on the peninsular between the port and Queen Charlotte Bay.

In the southeast corner of Symonds Harbor, the south arm of Port Philomel, there is a deep creek where abundance of fish may be caught by shooting a seine across at high water, about ½ mile from its head, and then waiting for the tide to fall.

**Settlements.**—A settlement is situated on the south shore of Rees Harbor, and another at the head of Edye Creek; in the latter there is a watering place.

**Port Richards,** in the southeast corner of Queen Charlotte Bay, is a deep inlet, the head of which nearly joins the inner basin of Port Edgar; but it offers no very good anchorage except in a cove on the north shore. There is a settlement near the northeast extreme, but the port is completely out of the track of vessels.

**Antony Creek and Carew Harbor** are two small, well-sheltered anchorages on the south shore at the entrance to Port Richards, with 12 to 17 fathoms water except in the southern coves, where there is excellent anchorage in 4 to 7 fathoms, and good watering places.

Vessels requiring anchorage in the southeast part of Queen Charlotte Bay should run into one of these ports in preference to Port Richards. Antony Creek, the western, is the better, as the water is not so deep, and 10 or 12 fathoms may be found off a cove on the west shore, a little inside the entrance. The land is high on all sides of both creeks.

**A settlement** is situated on a creek which stretches to the eastward from the head of Carew Harbor.

**Double Creek,** a little to the eastward of Carew Harbor, affords very good anchorage for small vessels inside the islets at its entrance; there are two settlements at the head of the East Arm.

**Gull Harbor,** on the eastern side of Weddell Island, is an excellent port with a settlement. The British war vessel *Basilisk*, 1897, anchored in 12 fathoms water, with Mark Point bearing 64° and a red-roofed house 323°; but it is stated that a heavy sea, or swell, sets into this harbor during and after southeast gales.

**Tides.**—High water, full and change, in Shallow Harbor is at 9h. 30m.; springs rise 8 feet. At Halfway Cove, in the narrows leading to Port Philomel, at 11h. 45m., with tidal velocities of 8 to 10 knots an hour.

High water, full and change, in Symonds and Rees Harbors, Port Philomel, is at 12h. 30m.; springs rise 6 feet.

**New Island.**—Vessels bound into any part of King George or Queen Charlotte Bay, from the westward, should make New Island, which can not be mistaken, as it is the northernmost of the high cliffy islands that form the southwest portion of the Falkland Group, and the lofty cliffs at its northwest points are very remarkable.

If coming from the southwest these high cliffs will be the extreme land seen; but from the westward, two small but high islands, North and Saddle, will be open to the northward of New Island. Between these islands and New Island there is a clear but narrow passage with much kelp; as the winds are often baffling under the high

cliffs, sailing vessels should pass outside North Island, which is 335 feet high and steep-to.

**Ship Harbor.**—A vessel bound into Ship Harbor, on the east side of New Island, should haul round the northeast point, and, passing close outside Cliff Island, haul up for Small Islet at the head of the harbor. There is working room on either side of the islet, and deep water close to the kelp in every part of the harbor. The best anchorage will be found inside Small Islet.

**Settlement.**—The settlement is situated in a cove known as Tigre Bay, and here the British war vessel *Basilisk*, 1897, anchored in 12 fathoms water, stiff sand and mud and good holding ground, with plenty of swinging room, abreast a small islet on the west side of the cove. The north side of Coffin Island and south side of the islet, 180 feet high, touching and bearing about 115° used as a stern mark, leads to this anchorage.

**Supplies.**—The best watering place is on the beach at the head of Ship Harbor, and it is impossible to find a place better suited for vessels to touch at for the purpose of procuring a supply if passing westward of the islands. There is, moreover, abundance of excellent peat on the island, and any quantity can be obtained ready for immediate use from having been charred by fire. Rabbits are also very plentiful, but permission must be obtained before taking them.

The Admiralty Reserve is situated on the northwest side of Ship Harbor.

**Grey Channel,** southward of New Island, is clear of all danger on either side of Seal Rocks; but the tidal streams are very strong, and with westerly winds there is a heavy race, so that it is always better to pass round New and North Islands. But vessels going to the southward from Ship Harbor with northerly wind may run out through Grey Channel with a favorable tide.

**Tides.**—High water, full and change, in Ship Harbor is at 10h. 30m.; springs rise 8 feet; the westerly stream makes in Grey Channel at 7h. 30m.

**Tidal streams.**—Between New and Westpoint Islands and in the bays within that line the tidal streams are not very strong and except near the points would not prevent a vessel's working either way. They run to the northeast from half ebb to half flood by the shore and to the southwest from half flood to half ebb.

**Directions.**—Though the bays in West Falkland appear so much exposed to westerly winds, there is much less swell in them than might be expected. The tidal streams in the offing, running across the bays from point to point, render their navigation much easier, while they contain so many well-sheltered harbors and anchorages that a stranger, if caught in a westerly gale and unable to weather

the headlands, need have no hesitation in running up either King George Bay or Queen Charlotte Bay.

In King George Bay good anchorage will be found inside of Hummock Island, and in Queen Charlotte Bay, by hauling round Swan Point and anchoring under the lee of any part of the east side of Weddell Island; or if the weather be quite clear, running for Shallow Harbor on the north side of Queen Charlotte Bay.

New Island might be found most useful to sailing-vessels, caught in heavy gales to the southwest of the islands, instead of knocking about for days and nights, with the chance of getting on a lee shore or being drifted toward the Jason Islands.

Directly the high cliffs of New Island, or Beaver Island, are seen, a vessel should bear up, pass northward of New and North Islands, and haul to the southward into Ship or South Harbor; the former is preferable, as the holding ground in South Harbor is reported to be hard and indifferent.

In Ship Harbor a sailing vessel may lie quietly, saving all wear and tear, filling up with water and fuel, and probably obtaining fresh provisions from the settlement; and as soon as the gale is over and the wind draws round, the voyage may be prosecuted either northward or southward.

A sailing vessel endeavoring to enter Ship Harbor, either from the strength of the gale or from previous damage, might be unable to fetch into safety; in such case she should not hesitate to bear up and run along the group of islands of the northwest coast of Weddell Island, and when Bald Island is made out pass it on either side and haul up into excellent anchorage in Bald Road to Chatham Harbor.

**Weddell and Beaver Islands.**—To the southward of New Island there are numerous anchorages in the channels between Weddell and Beaver Islands.

**Beaver Harbor,** on the east side of Beaver Island, is the best of these anchorages; the chart and the kelp will guide any vessel into it. It is connected with Grey Channel by a number of channels between the islands, and with the sea to the southward by Governor and Tea Channels. The northern entrance to these channels is well marked by two singular rocks named the Colliers, which appear from some directions like vessels under sail. They lie on the western side of the entrance, and may be passed on either side close-to.

But as all these channels are too intricate to be generally used, no detailed directions need be given. The tidal streams set powerfully through them, and at the southern entrance from a heavy race. Vessels caught off the southern shore of the group in a southwest gale and unable to weather Beaver Island might run for either Governor or Tea Channels in safety.

**Settlement.**—There is a settlement and flagstaff in a cove about a mile southward of Beaver Harbor; the British war vessel *Basilisk*, 1898, anchored here in 7 fathoms water, clay and good holding ground, just inside the entrance points and about 1 mile from the settlement.

**Governor Channel.**—Staats Island, between Beaver and Weddell Islands, is easily known by the remarkable detached cliff at its south end. Immediately westward of this bluff is the entrance to Governor Channel, which is clear of all danger and may be entered during the heaviest gales in safety; by hauling close round the north end of Staats Island good anchorage, sheltered from every wind, will be found off its northeast point; but the water being rather too deep (15 to 18 fathoms) for merchant vessels to get up their anchors quickly, it would be better for them to run through Governor Channel, past Middle Island, and then French Harbor will be seen a little on the starboard bow.

**French Harbor.**—Into this harbor any sailing vessel may run in safety, furling her sails if possible before she gets in, should it be blowing strong from the westward, and anchoring in its south corner in 5 to 7 fathoms water. The only disadvantage of this harbor is that the channel is rather narrow for a sailing vessel to work out again; but it is quite clear from shore to shore, and a vessel may tack in the edge of the kelp on either side.

**Tea Channel,** the passage on the east side of Tea Island, is also very good, being clear right across; but there is kelp all over the entrance, though it shows only at slack water. The least water in the kelp is 6 fathoms, but with a southerly gale there is a heavy race across the entrance. This passage may be easily found, when coming from the southward, by the Horse Block, a singular needle-shaped islet or rock, 220 feet high, about 2½ miles southeastward of it.

In the narrow channel between Staats and Tea Islands there is hardly water for a boat at low water; and that to the westward of Governor Island is also very narrow and fit for only very small vessels. There is kelp across the entrance, with only 2 fathoms water through it.

**Chatham Harbor.—Bald Road** is on the west side of the entrance of Chatham Harbor, on the north coast of Weddell Island. Approaching from the westward, Bald Island, small and round-topped, with a high cliff on its west side, will be seen lying close off Beacon Point, on which is a hill 275 feet high. A vessel can run between this point and Bald Island and haul up into good anchorage in Bald Road, under Beacon Point.

A vessel passing eastward of Bald Island must give it a good berth to clear a detached kelp patch which lies ¾ mile to the eastward of it, and may then either anchor in Bald Road or run on to Chatham Har-

bor. All the dangers there are marked by kelp, and the best anchorage is in Elephant Cove, where there is a good watering place.

**Tides.**—High water, full and change, in Chatham Harbor is at 9h.; springs rise 8 feet.

**Smylie Channel—South Harbor.**—There is a safe entrance into Queen Charlotte Bay through this channel, between Weddell Island and the mainland. Cape Orford, the south entrance point, is cliffy, and within it is Orford Hill, about 325 feet high; the Sea-Dog, a small island 140 feet high, lies off Cape Orford.

There is a heavy race in Smylie Channel with westerly winds and the tidal stream running out, and the kelp, which extends nearly across the west entrance, shows only at slack water; but under the kelp there is a depth of 4 fathoms. The deepest water is on the Weddell Island side of mid-channel.

When inside this entrance an opening will be seen on either side of Dyke Island; the northern leads directly into Queen Charlotte Bay, and the other into South Harbor, in every part of which there is good anchorage for large vessels.

The reefs at the east entrance of Smylie Channel always show and can be passed on either side in safety; but the best passage is that close to the shore of Weddell Island.

**Stop Cove.**—Good anchorage may also be found on the north side of Smylie Channel, in Stop Cove, which is formed by a low green tussok island, joined to the shore by a spit, dry at half tide. Vessels bound to the westward through Smylie Channel may anchor in this cove to await either the tide or daylight; and it is the best anchorage in any part of the channel.

**Penguin Cove,** about 1 mile north of Stop Cove, has a good watering place and abounds in geese.

**New Year Cove,** on the eastern side of Weddell Island, just within the eastern entrance of Smylie Channel, is an excellent port.

**House Cove.**—There are some coves on the eastern side of Dyke Island with good watering places, but they are out of the way of vessels going through Smylie Channel. One of these, House Cove, is an excellent place to beach a small vessel, the rise and fall of tide at springs being 10 feet.

**Rodney Cove,** the only place of shelter on the south side of the West Falkland between Cape Orford and Port Stephens, is a secure and safe anchorage, but can be entered by sailing vessels only with a leading wind. The kelp extends nearly across the entrance, but there is water in mid-channel for large vessels. A small lane of clear water near the middle of the kelp shows the channel, and when inside the kelp anchorage may be found in any part of the cove in depths of 3 to 8 fathoms.

**Port Stephens,** the first port westward of Cape Meredith, may be easily known. The land is very remarkable; Bird Island, Castle Rock, and Stephens Bluff, a remarkable cliffy head, are westward of the entrance, and the Three Crowns, a notable hill, 480 feet high, with three distinct masses of bare rock, is about 2 miles to the southeast.

The entrance, 400 yards wide, lies between two cliffy points, 60 or 70 feet high—Pea Point and Cross Island—and is easily seen.

A small rocky islet lies northeastward of Stephens Bluff, and off it there is kelp and a rocky bottom for nearly ½ mile in the same direction.

**Settlement.**—Within the entrance the port is about 7 miles long and 1 to 2 miles wide. Anchor Inlet lies northward of the entrance, and Hoste Inlet in the northern part of the port. At the western extremity at the head of a small inlet is the settlement, consisting of red-tiled buildings with a flagstaff.

**Communication.**—Communication is kept up with Stanley Harbor by means of a schooner which conveys the mails and supplies.

**Anchorage.**—There is good anchorage off the settlement in 13 fathoms water, with Stephens Peak bearing about 198°, and outer east point of the inlet 111° small vessels may go nearer the settlement.

Also, in Anchor Inlet, north of the entrance to the port, there is snug anchorage in depths of 9 to 13 fathoms, mud, off the sandy beach on the eastern side. Kelp extends off both points of the inlet, but the water is deep to the edge of it.

There is also a fair anchorage to the southeast of the rocky islets.

**Directions.**—In making Port Stephens from the northwestward Castle Rock and the outer part of Stephens Bluff have a very similar appearance. When running for the port vessels may pass tolerably close to them, as they are steep-to; but with much swell from the southward, it would be better to open the entrance well before standing in.

From abreast Stephens Bluff the entrance must be approached bearing north, which will avoid the foul ground northeast of the bluff and lead clear of all danger. Some stalks of kelp may be seen, but they can be avoided by keeping a little more to the eastward. The tidal stream seldom attains a rate of more than 2 knots an hour.

Within the entrance the two rocky islets must be left on the starboard hand, when course may be shaped for Anchor Inlet or the settlement. The dangers northward of Knoll Island are all marked by kelp.

Vessels not wishing to enter the port may find a convenient anchorage between Pea Point, the west point of entrance, and Stephens Bluff. Steer as to enter the port, and when about ¼ mile from Pea Point haul to the westward and keep near the north shore until

abreast of Stephens Bluff Island, anchoring where most convenient; the bottom is sand mixed with mud, and the depths are from 6 to 10 fathoms.

This is a convenient place for vessels anchoring for a night, as it is more easily left than Port Stephens. In entering it will be necessary to pass through some straggling stems of kelp, but the water is deep.

A good anchorage may also be found by passing between Cross Island and the islets southeast of it; but leaving is difficult for sailing vessels, as westerly winds blow directly into the entrance, which is too narrow for a vessel to beat through.

Port Stephens is not easily quitted by sailing vessels, excepting with a fair wind, particularly after a breeze from the southward, when a heavy swell sets in.

**Tides.**—High water, full and change, in Port Stephens is at 7h. 45m.; springs rise 7 to 8 feet.

**Cape Meredith,** the south point of West Falkland, is 290 feet high, with a hill 790 feet high a mile to the northward.

There is a heavy race off Cape Meredith, with southerly winds.

**Arch Road,** the next port eastward of Port Stephens is a good anchorage, and much frequented by whaling vessels. It is formed entirely by the Arch Islands, which are remarkably rugged, with upright light-colored cliffs, and take their name from a natural archway at the southwest end of the south island.

The road is entered by passing westward of the two large islands—between them and Clump Island. This anchorage, on account of the more convenient depth for anchoring, is preferred to that of Port Albemarle. Vessels lie here well sheltered from the swell, but feel the full force of the wind.

A 2½-fathom shoal about 1 mile in extent, northeast and southwest, which breaks in heavy weather and is marked by the kelp when not underrun by the tidal streams, lies about 166°, distant nearly 1 mile from the Southern Clump Island.

**Port Albemarle.**—Albemarle Rock is a good guide to Port Albemarle. It is bold, upright, about 150 feet high, saddle-shaped at the top, and whitened at its sides by the innumerable birds that frequent it. It bears 135°, distant 1¼ miles from the northeast end of the Arch Islands, and may be passed on either side at ¼ mile.

To enter this port vessels may pass on either side of the Arch Islands, care being taken to avoid the patch of 2½ fathoms southeastward of Clump Island. Albemarle Road is free from danger but inconveniently deep, and leads to a good anchorage in Lucas Bay in 10 fathoms water, to which large sailing vessels may work up with ease after rounding Lucas Point and reef.

Albemarle Harbor, 5 miles northwest of the road, at the head of Northwest Arm, has depths of 10 to 12 fathoms; but the arm, being only 400 to 600 yards wide, would be difficult for a sailing vessel to work through. There is a settlement in the north inlet of the harbor.

**Chaffers Gullet,** lies close northward of Port Albemarle and its deep-water branches extend several miles inland; but it is too narrow to call for a more detailed description.

From Arch Islands to Port Edgar the coast is bold and clear, and the tidal streams do not exceed 2 knots an hour.

**Port Edgar,** easily known after making Cape Meredith or the Arch Islands, is the nearest opening westward of Fox Bay, about 5 miles distant. The entrance, a little more than 200 yards wide, is between two bluff heads, and, with the wind northerly, it would be difficult for a square-rigged sailing vessel to enter without warping.

It is about 7 miles long and 1 mile wide, with anchorage in any depth under 17 fathoms, and as a secure harbor is second to none. The inlet westward of the entrance will accommodate the largest vessels.

**A settlement,** marked by a flagstaff, is situated in a creek about 2½ miles southward of the entrance, and has a small pier affording landing to boats; the small creek west of it yields an abundant supply of fish, principally mullet and smelt. Fresh water can be obtained. There is a large wool shed in the south arm of the harbor, opposite the settlement; abreast of this in mid-channel is a convenient anchorage.

**Anchorage.**—Port Edgar has a great advantage over all the harbors to the northward and westward of it in having a moderate depth of water for some distance outside. When blowing so hard from the northward or westward as to prevent a vessel's entering, an anchor may be dropped in 15 to 20 fathoms water, sandy bottom, anywhere under the ridge that forms the southwest side of the entrance and extends southward about 4½ miles. With these winds the water outside is quite smooth; and if they should veer to the southward and make it necessary to weigh, the port will be open to leeward.

**Directions.**—When the wind is between west and southwest it is very baffling and squally; therefore good way should be kept on a sailing vessel when entering Port Edgar, and the western shore well closed, even to the edge of the kelp, where there is a depth of 24 feet a few yards from the rocks. By this means a vessel may shoot in past the heads so as to get the steady breeze inside; and once within, the harbor opens out suddenly. The rocks on both sides of the entrance are bold-to, with depths of 10 to 12 fathoms in mid-channel.

A sailing vessel should not quit the port after a southerly gale without a commanding breeze, as the heavy swell without the heads

continues for some time. But, as northerly winds generally follow a breeze from the southward, detention is little to be feared.

**Tides.**—High water, full and change, at Port Edgar is at 7h. 15m.; springs rise 6 feet. There is but little tidal stream at the entrance.

**Burdwood Bank,** situated about 90 miles south of Falkland Islands, is about 210 miles long, east and west, and 60 miles across the widest (western) part, with general depths of 60 to 80 fathoms, bottom chiefly coral, and 25 to 30 fathoms near the middle. There are depths of 133 to 195 fathoms close to its southern edge, and 103 to 117 fathoms close to its northern edge.

# CHAPTER V.

## ISLANDS AND ROCKS SOUTHEAST OF THE FALKLANDS, SOUTH SHETLANDS, SOUTH ORKNEYS, ETC., AND ANTARCTIC SOUTH AMERICA.

**Shag Rocks.**—These rocks, assumed to be in latitude 53° 48′ south, longitude 43° 25′ west, were reported to have been seen on April 2, 1855, by the master of the ship *Ellerslie*, who described them as showing as three separate peaks about the height of a ship's mast above the water. More recently Capt. C. Vaux, of the ship *Epsom*, bound from Callao to Ceylon, sighted three rocks which he made to be in latitude 53° 40′ south, longitude 43° 30′ west; they appeared to lie north and south, about ½ mile apart, pinnacle in shape, black, and about 150 feet high. These rocks, which at one time were reported to be awash, may have given rise to the supposed existence of the Aurora Islands.

In 1896, Lieut. C. H. Kempson, R. N. R., by observations taken by him when passing the Shag Rocks, found them to lie 20 miles eastward of the assumed position; also that about 18 miles eastward of Shag Rocks there is shallow water with a rock awash, but this danger did not appear to be of any great extent.

In 1909, Capt. Sinclair, of the steamship *Coronada*, reported them to be in latitude 53° 43′ south, longitude 42° 20′ west, which position has been accepted. A rock awash is situated about 9 miles, 107° from this position.

**South Georgia,** lying between the parallels of 54° and 55° south, and between the meridians of 35° 50′ and 38° 15′ west was discovered by Antony La Roche in 1675, and afterwards explored and taken possession of by Capt. Cook, in January, 1775. It is now a dependency of the Falkland Islands.

Seven whaling companies now lease sites for stations on the island, have floating factories, and have erected buildings on shore abreast them.

A magistrate resides at Leith Harbor in King Edward Cove, Cumberland Bay.

**Aspect.**—South Georgia, about 100 miles in length in a northwest by west and southeast by east direction, and 20 miles greatest breadth, is high and appears to consist of almost perpendicular mountains,

usually covered with ice and snow to the water's edge. After a mild winter the lower hills near the coast appear of a light brown color, free of snow.

The shores, especially the northern, are deeply indented, reducing the island in one place to only ½ mile in breadth; but the large quantity of ice in the bays renders them inaccessible during the greater part of the year and dangerous for a vessel to lie in on account of the breaking of large parts of the ice cliffs, which break off and float to sea. The largest glacier in the island is the Nordenskjold Glacier in Cumberland Bay. The *Moltke* in passing Possession Bay observed two massive glaciers fall into the sea, and many icebergs were close to the coast and some aground in the bays. Coal was reported to have been discovered in Possession Bay in 1898, but there is reason to doubt the statement.

Capt. Weddell, with the *Jane* and *Beaufoy*, in the mouth of March, 1823, anchored in Adventure Bay on the southwest side of the island, near its northwest end, in 7 fathoms of water over clay, and "the crew, after having suffered much from cold, fogs, and wet during the two months they had been navigating the southern ocean, fed plenteously on young albatrosses and greens, which, although bitter, are very salutary, being an excellent antiscorbutic."

The following remarks are taken from a report of Commander M. H. Hodges, of the British war vessel *Sappho*, who visited the island in February, 1906:

The island is very mountainous, and all the peaks are covered with snow throughout the summer; the lower peaks and hillsides are clear of snow, though it remains in the hollows and on the sheltered slopes. There are many glaciers, some of them very fine, two or three of those seen being about 3 miles long; they do not form large icebergs, but small pieces are continually breaking off, and the shores of the bays are in some places strewn with them.

There is scarcely any flat land, the hills in most cases coming down almost perpendicularly to the sea; around the shores of some of the bays there is a little flat land covered with moss and tussoc grass. The green vegetation extends a little way up some of the slopes of the lower hills, but it is everywhere very wet and spongy, due to the many streams of melted snow running down the hillsides.

There are many kinds of sea birds, including albatross, penguin, cormorants, cape pigeons, cape dove, small tern, etc.; of land birds there are two kinds, viz., larks and chionis, or sheathbill; there are also said to be a number of ducks.

There are three kinds of seals which inhabit South Georgia, the sea elephant, sea leopard, and Weddell seal; the latter not common, and not a single fur seal has ever been seen on the island.

Whales, principally humpback, are abundant in the neighboring seas. The whale and seal fisheries are not preserved. Owing to the difficulties and expense of the whale fishing it is almost impossible for any species of whale to be completely extirpated; but the seal elephants have no such hope of preservation.

There are no indigenous land animals; rats are found, but they have evidently been introduced by sealing vessels.

**Climate.**—The winter sets in toward the end of May, and early in June there is a depth of 10 feet of snow down to the sea level. During June, July, and August a continual series of gales is experienced, and very little work can be done. The snow commenced to melt last year (1905) toward the end of September, but the real melting did not set in until the latter part of October. This summer (1905–6) has been somewhat milder than last, during which a good deal of snow as well as rain fell. During the four days the *Sappho* spent in the island snow fell on two occasions. This snow does not lie, as in the intervals the sun is warm and the climate pleasant, but fog is very prevalent.

The wind is extremely changeable, shifting very suddenly from one direction to another and increasing and diminishing in strength with equal rapidity. Close to the land the squalls come off the mountains with extraordinary violence, whipping the spray from the water 20 or 30 feet into the air. The result of this is that there is scarcely ever a calm sea off the island, and whaling in this locality must be carried on in large and well-found vessels.

The only parts in which vegetation appears are on the northeast side during the summer, when some of the snow becomes melted; the southwest side, being deprived of the sun's rays by the great height of the mountain, is always frozen.

The inner parts of the island are desolate and almost entirely barren, the only vegetation being a coarse, strong-bladed grass growing in tufts about 2 feet high, wild burnet, and a plant like moss which sprang from the rocks.

**Islets.**—There are numerous off-lying islands, the most important of which, the Clerke Rocks, lie 40 miles eastward from the south extreme of the island. Cooper Island, a rock of considerable height, lies 1 mile from the southeastern end of the island. About 8 miles north-northeast from Cooper Island, and nearly the same distance off shore, there is a reef of rocks.

Off Cape Disappointment, the south extreme, 12 miles southwest of Cooper Island, there are three or four small islets; the southernmost, Green Island, low and flat, lies 3 miles from the cape. Wallis Islet, near the western extremity of South Georgia, is a high rock of moderate extent. No rivers or streams were seen.

**Rocks.**—A rocky ridge about 3 miles long and about ¼ mile broad, over which there is a depth of 18 feet, is situated with its center about 7 miles 108° from Cape George. This ridge, on which the steamship *Fridtjof Nansen* was wrecked in 1907, is steep-to, there being a depth of 100 fathoms close to it.

A rock on which there are heavy breakers is situated about 6 miles northward of Wallis Island, off the west end of South Georgia.

**Cape Saunders—Light.**—From Cape Saunders, on the northern side of the island, there is exhibited a flashing white light visible 18 miles. It is reported to be unreliable.

**Directions.**—Making the northern end of South Georgia from the northwestward, in clear weather bearings of Wallis Island and Bird Island would give a good position, and Cape North would

easily be distinguishable; but should the weather be thick, and this is usually the case, to avoid passing to the westward of the island course should be steered to endeavor to make the land at Cape Buller. Cape Buller, from its height and rugged appearance, is easily distinguished; Welcome Island and some small rocks lying about 2 miles to the westward of the cape, being the only outlying islands on this part of the coast, also serve to render it unmistakable.

From Cape Buller the coast to the eastward is easily followed, the Bay of Isles showing up well and possessing several fine glaciers. From the Bay of Isles course should be altered to pass Cape Saunders, which is a low-lying point easily distinguished by its lighthouse. After passing Cape Saunders, Cape George, which from this direction shows as a sugar loaf standing well out from the land, with some outlying rocks, can not be mistaken, and before reaching it the entrance to Cumberland Bay will easily be made out. The coast between Cape Buller and Cape George appears to be free of all dangers at about 3 miles from the land. Should the weather be clear enough to distinguish the peaks, Mount Paget, the highest mountain on the island, brought to bear 198°, will lead into Cumberland Bay.

The bottom is very irregular and does not give a very good indication as to the proximity of land.

**Anchorages—Antarctic and Fortuna Bays.**—Between Possession Bay and Cumberland Bay there are two harbors, named Antarctic Bay and Fortuna Bay, respectively. These harbors both possess anchorages and are used by the whaling steam vessels. There are no known dangers in Antarctic Bay, but several rocks lie across the entrance to Fortuna Bay.

**Cumberland Bay—King Edward Cove.**—By far the best anchorage in the island is King Edward Cove, situated about half way up the southern arm of Cumberland Bay. This cove affords perfectly safe anchorage in any weather for vessels of any size in 10 fathoms, clay bottom.

There is also good anchorage in a small bay situated in the northeast corner of the western arm. Cumberland Bay rarely freezes over sufficiently to prevent steam vessels from getting in and out.

**Lights—Larsen Point.**—From a structure painted in white and blue stripes on top and with a blue band on sides, 10 feet in height, situated on Larsen Point, is exhibited, at an elevation of 70 feet, a group-flashing white light, visible 14 miles. It is reported unreliable.

**Sappho Point.**—From a red framework structure erected on Sappho Point is exhibited a fixed white light, visible 12 miles, but it is unreliable.

**Edwards Point.**—From near Edwards Point there is exhibited a fixed white light, visible 4 miles, but it is unreliable.

**Settlement.**—At the head of King Edward Cove is situated the whaling station of Grytriken, consisting of the house of Capt. Larsen, who is in charge of the station, several huts, and a boiling-down factory, the latter lighted by electricity. There is also a blacksmith's shop and a slip fitted with powerful winches for heaving whales up on shore.

A wooden pier opposite the factory allows a vessel of 16-feet draft to come alongside.

**Supplies.**—A hulk containing stores and coal for the whaling vessels is anchored in the bay. Some sheep, pigs, and poultry are kept for use of the settlement. There is a quantity of good peat near Grytriken, but no use is made of it owing to the difficulty of drying it in such a climate.

Between Cumberland and Royal Bays is Godthull Bay, large and well sheltered with some low, rocky islets in the entrance, but in the inner part icebergs sometimes ground and thus block the entrance.

**Light—Cape George.**—From a white iron house erected on Cape George, the eastern point of Godthull Bay, is exhibited, at an elevation of 120 feet, a flashing white light, visible 14 miles. This light is shown from October to May.

**Penguin Point.**—From a white iron house with red band situated on Penguin Point there is shown a flashing white light with red sector, visible 14 miles, but is reported to be unreliable. This light shows flashing red over Fridtjof Nansen Rocks.

**Royal Bay** is said to be not particularly well protected, and there are several hidden dangers in the outer part of the bay.

**Moltke Harbor.**—This anchorage, in a small bay which was named Moltke Harbor, on the western side of Royal Bay, being found to afford fair landing, with comparative freedom from glaciers, was chosen as a site for the observatory by the German transit of Venus expedition of 1882.

The bay, about 1½ miles across the entrance and 1 mile deep, is fringed by kelp on either side, and has depths of 22 fathoms, decreasing gradually toward its head. Rocks above and below water, marked by heavy breakers, extend southeastward about ½ mile from the north side of Royal Bay, but no shoals were found outside the kelp.

The harbor is difficult to distinguish on account of the low land on its north side, but from off the entrance two glaciers will be observed in the bight, and on the western side of the smaller one is a black rock about 80 feet above high water, which stands off well against the snow-covered mountains.

In Moltke Harbor the soil is found to be covered with a layer of peat over clay, and subsoil of black sand and gravel. Tussac grass found growing under the snow was, with the exception of moss, the only vegetation seen.

Seals, penguins, and many kinds of sea birds were numerous, and of edible kinds duck and pigeons were found.

**Directions—Anchorage.**—Approaching from the northwest, steer for Cape Charlotte, and having passed the breakers at 1½ miles steer for the land between the two glaciers. When Moltke Harbor opens out to the west-northwest steer for the middle and anchor in 12 fathoms water about ¾ mile from the head of the bay.

The anchorage is sheltered from east-northeast through north to west-southwest, but is open to the other points, particularly from east-northeast to east-southeast. Strong westerly winds blow here, with squalls of hurricane violence, setting in from southwest and shifting to northwest. Southeast winds send a heavy sea into the bay, and when these winds blow—and they seldom last more than 24 hours—it is recommended that vessels put to sea.

In calm weather, with an easterly swell, drifting ice is brought into the bay by the flood stream.

**Tides.**—High water, full and change, at Moltke Harbor is at 7h. 20m.; tides rise 2½ feet, but are much influenced by the wind; the streams set fairly in and out of the bay at the rate of ½ knot an hour.

**Current.**—In the offing the current was observed to set east by north to northeast, ½ to 1 knot an hour; close to the coast it set east-southeast.

**Sandwich Group,** discovered by Capt. Cook in 1775, consists of the following eight islands: Zabodovskii (northernmost), Visokoi, Lieskov (westernmost), the two Candlemas, Saunders, Montague, Bristol, and Southern Thule, the last also comprising two islands, each volcanic, consisting of barren black rocks, some of which are of great elevation and covered with ice and snow. Zavodovskii is in latitude 56° 18′ south, longitude 27° 30′ west, and the islands occupy a space of 200 miles in a north and south direction.

In the end of February, 1823, Capt. Morrell, of the *Wasp*, while sailing around this group of islands, observed 9 active volcanoes, 6 of which were lofty, and 3, including the western of the two Candlemas Islands, were low, being nearly level with the water's edge. Bristol Island has a lofty peak, named Freezeland, shaped like a sugar loaf. Southern Thule consists of two islands of vast height, and in the northeast side of the western island Capt. Morrell discovered a good harbor.

Capt. C. A. Larsen visited the islands with the steam yacht *Undine* and steamship *Fortuna* in November, 1908, and among the remarks in his report he states:

Lieskov Island: An extinct volcano; coasts too steep to effect landing anywhere.

Zavodovskii Island: An active volcano; air poisoned by fumes of burning sulphur; landing impossible, owing to steep-to coasts.

Visokoi Island: The whole island is one magnificent glacier, with only a few bare plots; coasts steep-to and landing impossible.

Candlemas Islands: The northern part volcanic.

Southern Thule: Surrounded by pack ice, and unable to be approached, but the volcano appeared to be extinct.

At nearly all the islands many sea birds were found nesting, and penguins of different varieties, but very few seals, and few whales. The object of the expedition was to see if the Sandwich Group could be made available for whalers, and it was shown to be impossible.

## ANTARCTIC SOUTH AMERICA.

**General remarks.**—The territory to the southward of 65° south latitude was explored by the Charcot expedition of 1908–1910, and many new places were discovered. Judging from the islands of the Biscoe Group, Cape Waldeck-Rousseau and the peaks of Graham Land we are led to believe that the land is continuous to the southward of de Gerlache Strait, but our information at the present time on this region is very meager. Adelaide Island, close to the coast, was located by Biscoe and further southward Bellinghausen, De Gerlache, and Evenson sighted Alexander Land.

Charcot Land was discovered by the French expedition of 1908–1910 and named after the commander of the expedition. This expedition defined the limits of the discoveries of previous explorers: Smith, Palmer, Bellinghausen, Bransfield, Powell, Dumont, D'Urville, Ross, Dalman, the Dundee Whaling Fleet, Larsen, Evenson, de Gerlache, Nordenskjold, and Charcot.

**General aspect.**—The general aspect of this region is not unlike that of the Chilean coast of Patagonia, though the intense cold alters it in respect to the snowy covering, only in few places the bare rocks showing. Landing is made difficult by rocky coasts or ice-bound cliffs. The northeast sides of the islands are generally more accessible. In approaching these shores the bottom is very irregular and the lead is practically of no use in making a landfall.

**Climate.**—In summer fogs are frequent and usually come with light winds. Gales usually come from northeast to east and their approach may be determined by low barometer accompanied by a rapid rise of the thermometer, and preceded sometimes many days

by an ocean swell. Good weather is usually of short duration following the gales.

**Currents.**—Little is known of the tidal currents in this region. In Lemaire Channel the tidal stream sets weakly to the northward. It sets out from the fiords and near the land appears to set to the northeastward. In the open sea, from latitude 67° to the southward, the stream apparently sets to the southward. Near Peter I Island it seems to set to the southward. In the southern Pacific the stream sets to the northeast; but in the latitude of Cape Horn it turns to the southwest, and in the middle of Drake Strait it has an easterly set.

**Ice.**—The extent of the ice in this region is very variable. Atmospheric conditions influence it greatly. Larsen in the summer of 1902 reported ice extending beyond the line of Alexander Land and the Palmer Archipelago, and northward of 67° south latitude, but this is the only time it has been reported outside these limits.

In summer the shores of the Shetlands and Palmer Land, as also the northern part of Bransfield and de Gerlache Straits are usually clear of ice. In Bismarck Straits and to the southward the state of the ice is much more variable.

## THE SOUTH SHETLAND ISLANDS.

These islands, most of which are volcanic, were discovered by Mr. W. Smith in the brig *Williams*, in February, 1819, when on a voyage from Buenos Aires to Valparaiso and standing far to the southward.

The best known of these islands are the northern group, consisting of Clarence, Elephant, King George, Nelson, Roberts, Greenwich, Livingston, Deception, Snow, Low, and Smith Islands. They extend in a northeast-southwest direction for a distance of about 260 miles, are separated by deep channels, and surrounded by innumerable islets and rocks.

**Sugar Loaf Island,** which is about a mile distant from the east side of Clarence Island, in latitude 61° 15′ south, longitude 53° 25′ west, is so far as can at present be ascertained, the eastern island of the group, the northernmost rock, lying off Elephant Island, is placed in latitude 61° 0′ south, longitude 55° 10′ west, and Williams Rock, to the southward of Smith Island, and the western of the group in latitude 63° 16′ south, longitude 63° 12′ west.

All of the northern parts of the coasts of the South Shetlands abound with islets, rocks, and breakers, while the southern coasts are entirely clear of these dangers; in the early part of the spring the southern sides are blocked with ice, which comes from the mainland adjacent to the southward; this mainland is bordered by rocks and breakers.

The interior of the south Shetlands consists of high hills or mountains; Clarence and Smith Islands being 4,557 and 6,600 feet respectfully above high water.

The islands, all the year around, are almost entirely covered with snow, and only after midsummer (in January) a few tracts which are free from snow are overgrown with lichens and mosses, in some places supplanted by a sort of straggling grass. A species of coal, which burnt very well, has been found.

The summer may be compared to a dull November in England, and the winter as one long starless and desolate night. There is a good deal of fog and numerous gales, but the sun is often visible, and the weather may be considered mild. To the leeward of the islands whalers are seldom interrupted in their work by the weather. Sea fowl, such as the albatross and penguins, are numerous, as were also seals before their extermination by seal hunters.

**Rocks.**—A group of rocks were reported by Capt. Bransfield in 1820 to lie 23 miles northeastward of King George Island.

**Bridgman Island** is located near the center of the group. It is of volcanic origin, 2 miles in length and 1 wide, with an elevation of 560 feet, and having the form of a truncated cone. Its cliffs are reddish brown in color and almost perpendicular to the northward, gradually sloping to the southward. Within 200 yards of the points there are many small rocks.

**King George Island.**—This island is much indented on its southern side, and is 40 miles long in a east-northeast and south-southwest direction and about 12 miles wide at its widest part. From North Foreland Point to Cape Melville the coast has high ice cliffs bordered by reefs or islets such as Simpson Islet and Ornen Rocks.

**Rocks.**—A ridge of rocks, known as Ornen Rocks, on which is a rocky islet, extends for a distance of about 3 miles from Cape Melville. A reef of rocks, known as Telefon Rocks, extends for a distance of about 3 miles in a southeast by east direction from the western entrance point of Admiralty Bay.

**Cape Melville** is formed by a small pointed summit extending into a narrow rocky tongue with perpendicular cliffs on its southern side.

**From Cape Melville** the coast runs westward, hollowing out into a bay bordered by a plain of ice. At the western side of this bay is Penguin Island, beyond which is a deep indentation called St. George Bay. The whole of this coast is beset with reefs.

**Anchorage.**—West-southwest of Penguin Island there is anchorage in 15 to 20 fathoms, pebbly bottom. This anchorage is very exposed.

The coast from St. George Bay trends to the southward and thence to the westward to Syzerol Point, where it hollows out to the north-northwestward, forming Admiralty Bay. From this bay the coast again trends westward to a deep indentation known as Port Collins and then westward to Field Strait, which separates this island from Nelson Island.

**The northern shore** has a general west-southwest and east-northeast direction. To the westward of North Foreland Point is Esther Harbor, and about midway of the coast Broad Point juts out very prominently to the northward.

**Admiralty Bay,** situated about 9 miles westward of Martin's Head the western point of St. George Bay affords the best anchorage in the Shetlands, being well-sheltered all around and having moderate depths over a bottom of good stiff clay. Ice from the glaciers, however, is frequently troublesome. The bay may be recognized by a remarkable hill named Three Brothers the top of which resembles the knuckles of the hand when firmly closed; there is also a peaked mountain over the bay. Its entrance is wide and deep except near the entrance points. A fringe of rocks extends about 1 mile from the western shore. The eastern shore consists of rocky cliffs terminating in three points, Legru, Syzerol, and Vaureal—from which rocks and islets extend. Chabrier Islet is the most important of these. From the western entrance point extend Telefon Rocks. The western shore of the bay is much cut up and indented and appears to be foul.

In the northern part of the bay there are three fiords, viz, Martel, Mackellar, and Ezcurra Fiords.

**Martel Fiord,** the eastern one, affords good anchorage for ships of any size. The bottom is glacial mud, forming excellent holding ground.

**Mackellar Fiord,** to the westward of Martel Fiord, has good anchorage sheltered from the prevailing winds. On the north and west sides is a huge glacier. The eastern shore should not be approached nearer than 400 yards on account of the bordering rocks and reefs.

**Ezcurra Fiord,** the western fiord, does not appear to afford good anchorage, as it is too much exposed to squalls, which are frequent and come from all directions. Dufayal Island occupies the center of the fiord.

Ice obstructs the entrance to Admiralty Bay to a considerable extent, and for this reason it has practically been abandoned by the whalers.

**Water.**—Good water may be obtained expeditiously, but not until the month of January.

**Nelson, Roberts, and Greenwich Islands** are ice capped, without any prominent peaks. Their shores are rocky and of forbidding appearance.

**Field Strait,** between King George and Nelson Islands, is only navigable for boats at its northern entrance. In this strait there are some beaches, mostly of black sand and gravel, and some scanty vegetation, consisting of thick-bladed, strong, coarse grass, growing in small tufts about a foot high.

Between Field Strait and Admiralty Bay an anchorage known as Collins Harbor is capable of containing several small vessels.

**Nelson Strait,** between Nelson and Roberts Islands, affords safe navigation, and may be run through in any weather, as there are no known dangers, except what may be seen; the east side is the clearer of the two, and here is a snug little harbor named Harmony Cove.

**Table Island,** situated northwest of Roberts Island, in latitude 62°·22′ south, longitude 59° 49′ west, is by far the most remarkable island in this locality, and will always be an infallible mark for anyone approaching, as it is not possible to mistake it for any other land. Its top appears perfectly level and its sides resemble a wall; in the upper part of its northeast end is a chink or division, which, from some directions, may be seen.

Flat Island and some surrounding rocks, about 3 miles northward of Table Island, are dangerous in foggy weather.

**Clothier Harbor,** on the north side of Roberts Island and about 6 miles eastward of Table Island, is entirely surrounded by a labyrinth of small islands and rocks, both above and below water, so that great caution is necessary in approaching it, and no reliable directions can be given.

Near the center of the harbor is a sunken rock, with 5 to 7 feet water, which greatly obstructs the anchorage; but there is room for about 9 small vessels to moor in 4 to 5 fathoms water, blue clay, with no room to drag, and it is the safest harbor, clear of ice, on the north side of these islands.

A vessel might warp into a small inner harbor on the east side.

**Tides.**—There is one tide in 24 hours, the rise being about 9 feet, but sometimes the tides are irregular.

**Tidal streams.**—At three-quarters flood in the harbor the ebb stream begins to run to the westward outside, and vessels bound in that direction may take advantage of this.

**English Strait** is navigable for vessels of any draft, but if under sail a commanding breeze is necessary, as the tidal streams set rapidly and irregularly across the northern entrance.

**Directions.**—Vessels entering the strait from the northward may pass on either side of Table Island, but the east side is the clearer of

the two. Then steer for the entrance, borrowing on the western side, the point of which is a projecting flat-topped rock with straight sides which have the appearance of being fluted; this rock is known as Fort William. Having entered the strait, navigation will be found to be clear.

**McFarlane Strait** separates Greenwich and Livingston Islands. Its northern entrance should not be attempted by any vessel drawing more than 9 feet water, as the tidal streams run strongly, sometimes attaining rates of 5 or 6 knots an hour. Close within this entrance is Cave Rock, where a boat may haul up or moor, and a large, dry, and warm cavern affords shelter in bad weather.

In 1893 the sealing steamer *Jason* passed to the northward through this strait, and reported that near the middle of the strait the channel was very narrow, with sunken rocks, breaking on either side.

**Hospital Cove or Yankee Harbor,** on the east side of McFarlane Strait, is nearly opposite Halfmoon Island, which is low and black and serves as a guide. The harbor, of circular shape, is formed by high land, an iceberg, and the low, gravelly tongue of land on the side of the strait, and will accommodate a considerable number of vessels which lie landlocked; but very heavy gusts come from the highland, especially when the wind is from the east.

The anchorage, in 17 to 22 fathoms water, is on a bottom of reddish brown ashes into which the anchor sinks to a great depth, but the holding ground may not be good; the harbor, however, has the advantage of being easily found, and entered or left by a sailing vessel with any wind.

**Directions.**—Entering from the southeast a high bluff with one or two patches of black on its south side, known as Mount Ephraim, should be passed close-to on the starboard hand, after which the harbor will be seen over a low tongue of gravel beach, which may be rounded close-to, but a small flat southward of the beach must be carefully avoided.

**Livingston Island.**—The aspect of this island is very different, having a high chain of mountains running in a northeast-southwest direction and a height of 3,135 feet in Mount Bowles and 3,491 feet in Mount Barnard. At the south there are two deep fiords; False or Palmer Bay of which the head is occupied by a large glacier; and South, or Ereby Bay, which is divided into two branches, of which one, the northeast, contains, it appears, excellent anchorages utilized as shelters by the whalers and also a kind of small wet basin called Johnson Dock. This latter is described below.

**Desolation Island,** on the north side of Livingston Island, when seen from a distance, presents an outline of nearly equal height, and on approaching it, the chasms in the rocks being filled with snow, the black and white interspersed make its appearance remarkable; some

of the hills are heaps of large stones. Approaching from the northward, in very clear weather, the white peak of Mount Bowles, 3,491 feet high, on Livingston Island, may sometimes be observed.

Some parts of the island are composed of hard, black, flinty rocks, while in other parts the rock is entirely rotten, and on burning some broken pieces of rock a strong smell of sulphur was emitted.

Here and there, on the soft ground, may be found a kind of spongy moss, and a little plant not unlike the seaweed that grows on rocks and stones; this is the only vegetation seen.

**Rock.**—A sunken rock, lying from ¼ to ½ mile northwest of Desolation Island, is very dangerous in calm weather, especially as both flood and ebb streams set over it with great velocity.

**Blythe Bay,** on the south side of Desolation Island, being partly surrounded by rocks, is apparently well sheltered from all winds from southeast through west to northeast. The best anchorage is in 13 fathoms water, blue clay, and a vessel should not anchor in less than 8 or 10 fathoms on account of the bottom being foul.

Great care is necessary when selecting a place to anchor, as the bottom may feel soft, although composed only of rocks covered by seaweed; therefore the lead should be armed to ascertain the nature of the bottom before anchoring.

There is generally a long swell from the eastward, and severe gales from that quarter send in a very heavy sea; and, although vessels have ridden out heavy gales in this bay, it would be prudent, when lying here, to sound and buoy the narrow western channel, known as Neck-or-Nothing Passage, through which a vessel parting in an easterly gale could run to sea. A vessel drawing 14 feet has passed through this passage.

**Directions.**—Gales from the northwest are not of frequent occurrence on this coast, but are exceedingly violent, and a vessel caught in one between Table Island and Cape Shirreff will find good shelter in Blythe Bay.

The northeast point of Desolation Island is a bluff covered with penguins, whose noise should indicate its proximity in thick or foggy weather. A vessel from the westward intending to seek shelter in Blythe Bay should pass this point either at a distance of 100 yards or more than 200 yards to avoid a sunken rock lying off it.

After passing the northeast point of Desolation Island, the high, craggy rocks forming the northeast side of the harbor, between which and Desolation Island there is a boat passage, will be seen, and passing the south point of these a sailing vessel can work to the anchorage in smooth water and with the lead going.

**Water.**—A good boat cove, named Coras Cove, lies on the northwest side of the bay, and here, on a narrow isthmus about 100 yards wide, is a pond from which good water may be procured, probably

depending on the season; but to the westward of the pond, by sinking a well on soft rising ground, excellent water was found.

**Supplies.**—Rock cod, which readily take a hook baited with penguin. may be caught in this harbor.

**Tides.**—Springs rise 12 feet (approximate); there is only one high water in 24 hours.

**Shirreff Cove,** protected from the north by Cape Shirreff, a perforated rock projecting into the sea and surrounded by breakers, and from the east by the highland of the island, is described as a wild roadstead.

The northwest winds blow directly into the cove, if of any strength, causing the sea to break heavily across the entrance, and from whichever quarter the wind is blowing there is always a long, heavy swell, causing vessels to roll considerably; but generally a strong undertow eases the strain on the cable.

Except actually within the cove the bottom is rocky and uneven, the depths being from 16 to 24 fathoms, and the best anchorage will be found to the north-northeast of a jagged point which terminates the highest part of the island, and about 400 yards from the rocks to the southeast; here the depths are from 18 to 22 fathoms, good stiff blue clay.

**Directions.**—A large perpendicular rock, flat at the top and known as Scarborough Castle, bearing about southeast, shows the opening in the passage between the breakers, but care must be taken not to mistake for this a perpendicular bluff to the southward of the cove.

**Rocks.**—About ½ mile eastward of Cape Shirreff is a dangerous ledge of rocks; also, at fully 3 miles east by north of the cape is a sunken rock on which the sea has been seen to break heavily.

**Tides.**—The rise is about 8 feet, but the tides are very irregular, as sometimes there is only one tide in 24 hours, while at others the tide may ebb for 3 hours, and then flow again and remain at high water for 3 hours longer without any appearance of ebbing..

**Barclay Bay,** between Cape Shirreff and Start Point, is said to be full of sunken rocks and very dangerous.

**New Plymouth or Rugged Harbor.**—Start Point, about 10 miles southwest of Cape Shirreff, has a rugged appearance, and off it shoal water is said to extend a considerable distance; approaching from the eastward in clear weather, Smith Island and Mount Pisco should be seen. New Plymouth, situated between Start Point and Rugged Island, may be recognized by the Eddystone and two rocks named the Pointers, which lie between it and Rugged Island. As a harbor this can not be recommended, being exposed to northwest winds, which send in a heavy sea, and the bottom being chiefly rocks and very foul.

**Directions.**—A vessel entering this harbor should keep toward the Rugged Island shore to avoid the shoal water off Start Point and anchor about 300 yards northeast of the southeast part of the island, which is bluff, in 20 to 22 fathoms, good holding ground.

Sealing vessels find this a convenient harbor, and haul close in or secure with a hawser to the island.

**Morton Strait.**—The tidal streams in Morton Strait are said to run with great velocity, causing whirlpools and rendering navigation dangerous.

**Johnson's Dock,** at the northeast side of the head of South Bay and directly under Mount Bowles, is a secure anchorage for six or seven small vessels moored in a tier, as neither wind nor swell can touch them; there is 7 fathoms water in the deepest part of the dock.

The entrance, however, is not easily found, the only mark given being a perpendicular cliff on its east side; it would therefore be advisable for a stranger to send a boat ahead, in the first place, to find a convenient depth of water for anchorage, as in places the water is very deep. There is anchorage close outside the dock, in depths of 17 to 20 fathoms.

South Bay is at times much incommoded by ice, especially after southwest gales, and when making this bay in thick weather care must be exercised not to mistake for it the entrance to False Bay.

**Deception Island** is the southwest island of the main group and lies 100 miles west of the northern point of Louis Philippe Land. It is the best known of the Shetland Group having always been the principal rendezvous of the fishermen. The island, nearly circular, about 7 miles in diameter, and icebound, is well entitled to its name, and a very extraordinary production of nature. It is of volcanic origin, the shores on either side having pumice stone with other substances which indicate its origin; there are also several hot springs, some of which have temperatures sufficient to boil an egg. Streams of water at temperatures of from 140° to 160° F. were found issuing from the sides of the hills in some places, and running into the basin, the water of which was scarcely above freezing point.

On the western side, however, there are some good beaches and enormous penguin rookeries. The outside of the island should not be approached nearer than 1 mile on account of lack of soundings.

**Port Foster.**—The land is high and bold on every side, particularly on the northeast, where Mount Pond has an elevation of 1,800 feet above high water. There is a narrow opening about 700 yards wide on the southeast side leading into a capacious basin named Port Foster, which is the best harbor known in these islands. It is about 5 or 6 miles across and has 127 fathoms deepest water, with mud bottom.

The opening is restricted to a channel 200 yards wide by rocks extending from the western side.

This channel is, however, perfectly straight and accessible to ships of any size. In entering pass close to the monolith at the entrance and thence along the northeast cliff for about 100 yards, thence around the northeast inner point, beyond which there are no dangers. Just inside the eastern entrance point is Whalers Bight. Vessels may lay broadside to the cliffs by planting anchors to the northwest and west and also ashore. Excellent water can easily be obtained here. There is a masonry pyramid at the northeast corner of the bay, several hundred yards from the beach, erected to the memory of a whaling captain who was lost at sea in the neighborhood. Beyond this bight the shore bends to the northward and is steep-to, except off the mouth of a small river which drains an interior lake; thence there are blackish looking cliffs, and the shore extends to the foot of a small semicircular recess, which is all that remains of Pendulum Cove, which has filled up from the falling cliffs. A small lake now occupies what was once the head of Pendulum Cove. There is anchorage all along the northeast cliffs in from 11 to 16 fathoms, but the holding ground is only fair, and it is exposed to winds from northwest to west. Many small streams enter the bay here, and it is frequented by seals.

The shore thence runs west and then south, forming a bay on the beach of which the *Telefon* was beached. On the southern side is a bay, at the head of which is the outlet for an interior lake. Opposite Whalers Bight, on the southern side, is another bight, but its entrance is narrow and much encumbered.

**Snow Island,** on the west side of Morton Strait, is of slight elevation and entirely covered with ice and surrounded with reefs.

**Rocks.**—Two rocks called Svip Rocks, lie distant 8 miles 331° from the islet off the north point of Snow Island, westward of Castle Rock.

**Smith Island.**—This island lies 40 miles west of Deception Island, and was first visited by Capt. Weddell, who described it as the highest and most forbidding of all the South Shetlands. Capt. Foster in the *Chanticleer* visited this island in January, 1829, and found it covered with snow excepting on the sides of the precipices and on the faces of the rocks, where it could not lie, and these from their black appearance presented a striking contrast with the high, snow-clad land. The highest point of Smith Island Capt. Foster named Mount Beaufort, but it is now more generally known by the name of Mount Foster, and calculated to be 6,600 feet above high water. Mount Pisco, the other peak of the island, is 4,350 feet high. Shoals extend for 2 miles off the northern shore, being indicated by breakers.

**Low Island.**—This small island is ice covered and very much indented and fringed with reefs.

**Rocks.**—Sail Rock lies to the southwest of Deception Island and is about 200 feet high with perpendicular sides. Austin Rocks, 28 miles to the southwestward of Deception Island are a considerable patch of rocks and reefs, but appear to be clear beyond 1 mile from the northern and southernmost visible rocks. Kendall Rocks lie to the southeast of Deception Island. Nor Rock is reported to lie 48 miles 6° from Cape Smith, the northern extreme of Smith Island.

**Ice—Bransfield Strait.**—The northern and western portions of Bransfield Strait are usually clear of ice from November to March; but the southern and eastern portions are frequently blocked. The seamen should, of course, study the ice chart in adopting this route.

## SOUTHERN LANDS.

**Louis Philippe and Joinville Land.**—Southward of the South Shetlands and separated by a broad and deep channel named Bransfield Strait are Joinville Island, Louis Philippe Land, Trinity Land, Hoseason Island, Graham Land, etc., of which very little is known, except that the land is very high, mountainous, barren, and generally covered with snow. All this land lies to the south and west of the South Shetlands.

In 1821 Powell discovered Trinity Land, south of the Shetlands; Palmer, an American, discovered a coast line east of Trinity Land; and the Russian navigator Bellingshausen discovered Alexanders Land, southwest of Palmer Land. In 1823 Weddell tried to find land east of the meridian of the Shetlands, but only succeeded in advancing as far south as latitude 74° 15′ south, where he found a sea clear of ice, but no land.

Louis Philippe Land and Joinville Island, which form the eastern part of the southern side of Bransfield Strait, were discovered by Admiral D'Urville, of the French Navy, in 1838, and visited and examined by Capt. Ross in 1843.

"On the 27th of February, 1838," remarks the admiral, "after a long stretch toward the south through much ice we came upon these mysterious lands; and in spite of the complicated obstacles against which we had to contend, both on acount of the continued bad weather and from the fog and ice, in the space of about eight days we succeeded in tracing their outline for a distance of about 120 miles between 63° and 64° south latitude. The land, which is crowned with immense peaks, is covered with perpetual snow of an unknown depth. Were it not for the black rocks, rendered visible by the melting of the snows which form their limits on the coast, one would scarcely be able to distinguish them from the numerous fields of surrounding ice."

In 1893 some of the crew of the sealing vessel *Jason* landed at Cape Seymour, Palmer Land, and found the land to be hilly, with deep valleys. The hills, often conical-shaped, are composed of sand, cement, and small stones, with here and there petrified wood.

**Joinville Island and Louis Philippe Land** are separated by a strait called by Nordenskjold Antarctic Strait, from which the latter land extends for about 50 miles to the southwestward to Orleans Inlet.

**Erebus and Terror Gulf** was explored by Ross in 1843, and Nordenskjold wintered at Snow Hill, in its southern part. Snow Hill, with another islet which terminates in Cape Seymour, affords protection to Admiralty Inlet, which, however, is said to be a strait.

**Dundee Island,** situated southwest of Joinville Island, was supposed to form a part of the latter island, but in 1893 the whaler *Active* sailed between the two islands by a passage which has been named the Firth of Tay. The island is about 24 miles long northwest by southeast and 150 feet high, and the firth is about 2 miles wide at the narrowest part.

**King Oscar II Land.**—In 1893 the Norwegian sealing steamer *Jason*, Commander Larsen, reached latitude 68° 10′ south and discovered King Oscar II Land and Foyn Land, which form the east coast of Graham Land. This coast, intersected by several fiords having an east and west direction consists of high, snow-covered mountain chains extending to no great distance from the coast and lying parallel with it. At the time of the discovery it was beset with pack ice.

Off the north side of King Oscar II Land several islands were found, the southeasternmost and largest being named Robertson Island. Northward of it two active volcanoes were seen on islands named Christensen and Lindenberg, the latter shaped like a sugar loaf. Westward of these volcanoes a group of five islands was named the Seal Islands and called Oceana, Castor, Hertha, Jason, and Larsen, respectively. East of Foyn Land, Wetter Island was discovered and so named.

**Trinity Land,** separated from Louis Philippe Land by Orleans Inlet, was discovered by Powell in 1821. Palmer Land lies to the southwestward of it and Davis Gilbert Strait separates it from Graham Land.

In 1910 a volcanic disturbance to the northeast of Trinity Land lifted up a large mass of water which fell on the deck of a small whaling vessel, completely demolishing the superstructure and killing the captain. The vessel, however, was saved.

**Danco Land.**—De Gerlache Strait separates a number of islands from Danco Land. The principal islands are Hoseason, Liege, Brabant, and Anvers, the latter being separated from Graham Land by

Bismarck Strait. De Gerlache Strait is frequently free of ice, but Bismarck Strait, its southern approach, is usually blocked besides being rocky and dangerous.

**Hoseason Island,** visited by Kendall in 1829, has two snowy peaks. Cape Possession is an islet to the northwestward, covered by snow, and separated from Hoseason by a narrow, dangerous strait. Hoseason is surrounded by many dangerous rocks.

**Intercurrence Island,** to the southeastward of Hoseason, is equally foul and appears to be connected by islets and rocks with Two Hummock Island, so that it is advisable to keep near to the Liege Island shore of the strait.

**Liege Island** has a conical hill in its northern extreme very similar to Cape Possession. Mount Bruggmann, the highest point of the island, is steep to the eastward but slopes to the westward. The passage between Liege and Brabant Islands is foul. Brabant Island is dominated by the Solvay Mountains, of which Mount Parry, which attains a height of 6,000 to 6,500 feet, is a regular pyramid near the west coast.

**Dallman Bay,** the entrance to Schillaert Channel, between Brabant and Anvers Islands, is full of low islands and rocks. On its south side are several bays, which might afford shelter from easterly winds.

Anvers Island is dominated by the Osterreith Mountains, of which Mount François is 9,413 feet high. Mount William, near the southern point of the island, is 5,046 feet high, and was so named by Biscoe. Excepting the east coast, glaciers descend everywhere to the sea. Rocks and shoals extend for a distance of 5 miles from the west coast.

**Wiencke Island,** southeast of Anvers Island, attains a height of 4,600 feet. The mountains slope down to Gerlache Strait, but are steep to the westward. Port Lockroy, on the western side of the island, affords good shelter, with moderate depths and good holding ground.

Capt. Paulsen, of the *Orm*, whaling steamer, in 1908, reported: "I sailed into Brialmont Bay and out by Davis Gilbert Strait, so that the northern portion of Danco Land is proved to be an island."

From Girard Bay to the southward, as far as Lemaire Channel, the shores are formed of almost perpendicular cliffs, from which flow glaciers of all descriptions. Beyond this the coast trends south-southwest for a short distance and then south-southeast and consists of ice cliffs, generally perpendicular. Waddington Bay, to the northward of Cape Tuxen, has a large glacier at its head. There are some high peaks in this vicinity.

**Cape Tuxen** is surmounted by Mount Demaria, a hill remarkable in appearance though of slight elevation (about 2,000 feet). From Cape Tuxen the coast trends southeast and is bordered by glaciers.

Extending to the south is a long line of rocky peaks ending in Cape Trois Perez, which forms the northern entrance point of Beascochea Bay.

**Mount Matin,** a snowy peak of 6,562 feet elevation, is the beginning of a snowy plateau extending to the southward from which rise summits of varying altitude but all snow covered and many of them having glaciers descending from them.

**Beascochea Bay.**—Cape Trois Perez is the northern entrance point of the deep indentation known as Beascochea Bay. This bay has the appearance of a vast fiord, very similar to Flandres Bay farther to the northward. Its sides are formed by broken masses covered with snow and having many glaciers. Just inside of Cape Trois Perez is a small bight having a fine beach. The plateau surrounding the bay and extending to the southward of it is completely snow covered. Cape Nunez forms the southwest entrance point of the bay.

**Islands to the southward of Wandel Island—Howgaard Island.**—This island is nearly as large as Wandel Island, but it has a much lower elevation. It is ice covered and its points are foul.

**Petermann Island** is a rocky island deeply indented with small fiords. The eastern one, Port Circoncision, affords excellent shelter for a medium-sized vessel. After entering, the entrance should be dammed up to prevent ice from coming in. This was the observation station of the Charcot expedition, and there are records left here by that expedition. The other fiords are impracticable as shelters.

**Argentine Islands.**—These islands are called Argentine, Roca, Crulls, and Quintana. They are low and their sides encumbered with reefs.

**Jalour Islands.**—This group of islands extend between Cape Tuxen and the Argentines and have navigable channels between them.

**Berthelot Islands** are rocky and almost devoid of snow. Durboux Island is a small snow-covered cone. The Vedel Islands lie well to the westward of Petermann Island.

**Caution.**—The directions given below should be followed with the greatest caution, as soundings are almost totally lacking.

**Directions—Deception Island to Port Lockroy.**—After leaving Deception Island steer direct for de Gerlache Strait, leaving Austin Rocks 2 miles on either hand, and passing between Hoseason and Interconcurrence Islands. Enter the strait between Liege and Two Hummock Islands, favoring the side of the former. The southern shores of Palmer Archipelago appear safe; but Cape Kaiser should not be approached too close, as there are two small islands projecting out beyond it. The passage between Liege and Brabant Islands is practicable for a small ship. Davis Island almost entirely closes this

opening, forming two channels. In 1905 the northern channel was free of ice. In taking this channel keep nearer Liege Island to avoid the dangers off Davis Island.

From Cape Kaiser to Port Lockroy, coast along Brabant Island, keeping about 1 mile offshore, thence take the middle of Neumeyer Channel. Note that off Astrup Point and Cape Felicie rocks project into the channel. A cairn on Casabianca Island at entrance to Dorian Bight marks the approach to Port Lockroy. Bulls Bay, on the eastern side of Brabant Island, offers a refuge if free of ice.

**Port Lockroy** is easy of access, the entrance being wide and clear, and it offers secure shelter for a number of vessels. On account of the ice this harbor can hardly be counted on except during the months of January, February, and March.

**Port Lockroy to Wandel Island.**—Coming out of Port Lockroy use either De Roosen or Peltier Channel. Follow midchannel and, on approaching the ice cliffs of Wiencke Island, turn in order to clear the point of Doumer Island, thence follow midchannel again, leaving Groetchy Island on port hand. When outside the channel round Cape Erraro at a good distance and steer for Cape Renard. After passing the Loic de Lobel Islands head for either Lemaire Channel or to the westward of Wandel Island. To reach Port Charcot head for the Mumm Islands to the northward of Rothschild Island, and after rounding these islands head for Français Bight.

**Port Charcot.**—The *Français* spent the winter of 1904 in this fiord; but it is not suitable, except in good weather, for a small vessel for a short stay.

**Wandel Island to Port Circoncision.**—From Cape Renard to Port Circoncision, Lemaire Channel is free from dangers; ice, however, frequently obstructs it between Wandel Island and Danco Land. Westward of Wandel Island and as far as Rallier du Baty Island a vessel should keep in midchannel and after rounding the southwest point of Cairn Hill cross Saltpeter Bay, heading for Gourdon Hill, the northern part of Howgaard Island being foul; thence cruise along the shores of Wandel Island, keeping about 200 yards offshore. The southern part of Howgaard Island is foul. Pass between Petermann and Howgaard Islands, keeping close to the northern shore of the former. After passing the southern point of Howgaard keep at least 500 yards from Petermann to clear the reefs.

Between Petermann Island and the Argentines there is a wide passage, but the chain of small islands extending to the southward of the former should be given a wide berth. A small island in the middle of this passage appears to be steep-to. Westward of this island head in midway between Vedel and Roca Islands. From Petermann Island to Cape Tuxen stand over close to Cape Tuxen to clear the reefs of the Jalour Islands. The north shore of Cape

Tuxen is clear as far as the islet marking the southwest extreme of the cape, but a wide berth should be given the islets and reefs on the eastern side.

**Graham Land.**—The name Graham Land has been applied to that part of Antarctic South America situated behind the Biscoe Islands and limited on the north by Beascochea Bay and on the south by Aubert Bay. It is a continuation of Danco Land and has the same mountainous aspect along the shore, which is bordered by numerous islands. The interior is somewhat more regular in appearance than Danco Land. Depths of 250 fathoms have been obtained at 3 miles from shore, and around some of the islands the depths are considerable. One of these islands, Pitt Island, has several bays which afford excellent shelter. The shores to the southward of Point Nunez appear to be much indented.

**Islands off the coast.**—Lahille Island, lying off Point Nunez, is formed of serrated ridges ending in perpendicular cliffs. Chavez Island, to the southwest of Lahille Island, is barren of snow and presents a very jagged appearance. On its eastern side there are many glaciers. Ferin Island is formed of a horizontal ridge, from which rises a snow-covered summit. Waldeck Rousseau Island has perpendicular cliffs on its southern side. Vieugue, Chaylard, and Larrouy Islands are more to the southward and westward.

**Biscoe Islands.**—These islands extend about 75 miles to the southwestward from the Martin Island being divided into two groups by a wide opening called Pendleton Bay. They are flat and ice covered and fringed with reefs and are usually marked by grounded ice bergs, which extend sometimes to distance of 25 miles. They are separated from the mainland by Grandidier Channel.

**Loubet Land.**—This land is a continuation to the southward of Graham Land and extends from Cape Bellue in Matha Bay to Bourgeois Fiord in Marguerite Bay. The general aspect of this land is that of rocky patches sometimes of great extent separated by deep fiords. Many of them are in fact islands, as for instance Adelaide Island.

**Matha Bay.**—This is a deep indentation included between the Biscoe Islands, and Cape Bellue, Loubet Land, and Adelaide Island. It is bordered by high mountains and many fiords extend from it into the interior of Loubet Land.

**Marin-Darbel Bay** indents the coast between Cape Bellue and Cape Rey. Andersen Island lies off shore beyond Cape Rey. Delaille Island is just west of it and both are surrounded with reefs. To the southward a vast bay opens out, which has been called Hanusse Fiord. Laird Island occupies the center of this fiord.

**Adelaide Island** was discovered by Capt. Biscoe in February, 1832. The island is about 70 miles long and 30 wide at its widest

part. It has a most imposing and beautiful appearance with two high peaks shooting up into the clouds and occasionally appearing both above and below them. A lower range of mountains extends about 4 miles from north and south, having only a thin layer of snow on their summits, but toward their base they are buried in a field of snow and ice of most dazzling brightness, which slopes down into the water, and terminates in a cliff 100 feet high riven and splintered in every direction to an extent of 200 or 300 yards from its edge.

The west coast is very foul, being fringed with small, snow-covered islands and reefs.

**Marguerite Bay.**—This bay is the vast indentation extending between Adelaide Island, Loubet Land, Fallieres Land, and Alexander I Land. In the northern and eastern part many fiords indent the coasts of Loubet and Fallieres Lands. To the southward the bay stretches out of sight. There are many islands in the northern part, the principal among them being the Amiot Islands, Roca Reefs, De Dion, and Maurice Faure Islands, the De Guebriant Islets, Jenny Island, and Leonie Island. It is thought that anchorage may be obtained in the vicinity of Leonie Island.

The southern part of Loubet Land is separated from Adelaide Island by the Laubeuf Fiord. It is formed of rocky cliffs more or less devoid of snow.

**Fallieres Land.**—This land is a continuation of Loubet Land to the southward and presents the same general aspect. The southern limit of this land so far as known is Cape Pierre Baudin, at which point the coast makes an abrupt turn to the eastward and no land has been sighted to the southward of this point and between it and Alexander I Land.

**Alexander I Land.**—This land is separated from Fallieres Land and Loubet Land by vast bodies of water filled with ice and appears to be an island of about the size of Adelaide Island, but much more distant from the mainland. It appears to consist of many high masses, some of them over 7,000 feet high. To the eastward are many small islands.

**Charcot Land.**—This land lies to the southward and westward of Alenander I Land and little is known concerning it. It appears to be bordered with ice cliffs and to have some summits over 6,000 feet high.

**Peter I Island,** lying several hundred miles westward of Charcot Land was discovered by Bellinghausen in 1821. It is about 4,000 feet in elevation.

**Ice.**—In January the shores of Antarctic South America are generally free of ice as far as latitude 68°, the bays and straits being, however, gorged with loose pack ice. Southward of this the lands

appear to be united by thick ice. This ice is dotted with icebergs imprisoned in it. Large fields of drift ice composed of sheets of variable area, sometimes of great extent, are frequently met with and their navigability depends to a large extent on the wind and tidal streams. Near Peter I Island the bergs are very numerous. Indentations in the ice are always marked by a rise in the temperature of the sea water.

## THE SOUTH ORKNEY ISLANDS.

These islands, discovered by Capt. Powell in the sloop *Dove* in 1821, and subsequently visited by Mr. Weddell in 1823, and by Admiral D'Urville in 1838, consist of two principal islands, named Laurie and Coronation, and a number of smaller ones.

**Laurie Island** is of a most remarkable shape, consisting of a series of narrow peninsulas, four of which, Mackenzie, Pirie Ferguslie, and Watson Peninsulas, point northward with deep bays between them. On the southern side of the island is situated Mossman Peninsula, which forms the western boundary of Scotia Bay, while at the eastern end of the island lies Ferrier Peninsula with Cape Dundas at its extremity. Between Uruguay Cove on the northern side and Scotia Bay on the southern side the island is almost divided into two, there being at this point the only low-lying piece of ground of any extent in the whole island. On this neck the observatory and other buildings of the Scottish national antarctic expedition of 1903 were erected.

The island is 26 miles in length from east to west, while the width varies from 11 miles to less than half a mile. It is stated by the above-named expedition to be situated about 15 miles northwestward of its charted position.

The summit of the island is estimated to be 3,083 feet above high water.

Northward of the western end of Laurie Island are several smaller ones; the outermost, named Saddle Island, on account of its appearance, is 1,643 feet above high water. The passage between Coronation and Laurie Islands is divided into two straits, by a group of islands named Powell Islands, after the discoverer; the eastern is known as Washington Strait and the western Lewthwaite Strait.

**Coronation Island** extends in a northwest-southeast direction about 38 miles, and is about 12 miles wide; the highest peak in the island attains a height of 5,397 feet; Point Penguin is its northwest point. Shoal water is reported to extend for a distance of 2½ miles off Foul Point. Westward of this island are numerous rocks, and nearly midway between it and the Inaccessibles, one named Despair Rock. The Inaccessibles lie 25 miles to the westward of Coronation, the summit of the highest is 337 feet above high water.

Mr. Weddell remarks that the "South Orkneys are, if possible, more terrific in appearance than the South Shetlands. The tops of the islands for the most part terminate in craggy, towering peaks, and look not unlike the mountain tops of a sunken island."

The loftiest of these summits, towering up to a point, he named Noble Peak, which in clear weather is visible from a distance of 45 miles.

Mr. R. C. Mossman, F. R. S. E., writing on the meteorology of the South Orkneys and of South Georgia in 1908, says:

Since the initiation of the South Orkney observations in 1903 by the Scottish national antarctic expedition, it has been established that, owing to the freezing up of the ocean to the south, these islands are subject for eight months of the year to continental conditions, and that an oceanic climate, such as was to be expected from the position of the group, only obtains during the late summer and early autumn months. In 1908, however, except for a few weeks in July and August, the South Orkneys were surrounded by sea, no pack ice was seen, and when in July the temperature fell a level plain of young ice was formed as the sea froze. Owing to the open season the penguins did not migrate, these birds being seen practically all the year round, except in the month of July. Sea elephants were observed in March, October, and November for the second year in the history of the station, while sea leopards, whose habitat is the pack and which are usually present in considerable numbers, were not seen except in the month of December.

The effect of this abnormal state of matters is clearly reflected in the meteorological records; but nothing one can bring forward bearing on this point indicates the openness of the season so forcibly as the following statement showing the time Scotia Bay remained frozen:

*Scotia Bay, South Orkneys.*

| Year. | Bay froze. | Bay opened. | Number of days closed with ice |
|---|---|---|---|
| 1903 | Mar. 30. | Nov. 23 | 238 |
| 1904 | May 8... | Jan. 2, 1905... | 240 |
| 1905 | May 17.. | Sept. 21..... | 128 |
| 1906 | May 25.. | Dec. 31..... | 221 |
| 1907 | June 6.. | Jan. 18, 1908.. | 226 |
| 1908 | July 7... | Aug. 27..... | 52 |

A closer season than any quoted above was that of 1902–3, as the Scottish expedition found Scotia Bay still frozen at the beginning of February, 1903, and when winter quarters were found there on March 25 the general appearance of the ice-foot and other associated factors indicated that the bay had but recently broken up. This, it will be remembered, was the year in which the Nordenskjold relief expedition failed to reach Snow Hill owing to the very unfavorable ice conditions in Erebus and Terror Gulf, where the *Antarctic* was nipped in the ice and foundered about the middle of February.

Last year, as will be seen from the table, it was not until July 7—nearly three weeks after the winter solstice—that Scotia Bay froze, remaining in this condition for the brief period of seven and a half weeks.

Whatever the conditions may have been that led to 1908 being such a remarkably open year in the Weddell Sea area, there can be little doubt that the absence of the pack and the high temperatures were in some way associated with the extraordinary accession of icebergs reported last winter in the region of Cape Horn and in the south Atlantic as far north as the fortieth degree of south latitude. At the end of July great chains of bergs, of which several hundred could be seen at one time, were reported by Capt. Larsen, of the steamship *Cachalotte*, to the north of south Georgia, while all winter masters of sailing vessels in the South Atlantic Ocean route around Cape Horn encountered bergs in large numbers, several ships being seriously damaged by colliding with bergs, some of which assumed the dimensions of veritable ice islands. Reference to available records would indicate that this recent outburst of ice from the Antarctic is the greatest since the year 1892.

The most outstanding feature of the meteorology of the year was the high barometric pressure and temperature of the month of June. Unlike every other month yet recorded with a high mean pressure, this pressure was associated with temperatures largely in excess of the normal.

While these conditions prevailed at the South Orkneys, comparatively cold weather prevailed at South Georgia, with the result that there was only a difference of 5° between the two places instead of the normal difference of 17°. In other words, the high barometer readings were not due to a northward extension of the antarctic anticyclone, which would have been accompanied by low temperatures, but were occasioned by the southern spreading out of the Atlantic high-pressure area. Pressure, as will be seen from the following table, was low to the west, and the June weather maps issued by the Argentine Meteorological Office give every indication of a permanent low-pressure area during this month over the south Pacific area in proximity to the Chilean coast and to the southwest of Cape Horn.

*June, 1908.*

| Station. | Latitude S. | Longitude W. | Mean barometric pressure. | Departure from normal. |
|---|---|---|---|---|
| | ° ′ | ° ′ | *Inches.* | *Inch.* |
| Sandy Point | 53 10 | 70 54 | 29.48 | −0.17 |
| Cape Virgins | 52 24 | 68 25 | 29.55 | + .04 |
| South Georgia | 54 13 | 36 33 | 29.58 | + .10 |
| South Orkneys | 60 44 | 44 39 | 29.58 | + .18 |

Hence, at Sandy Point barometric pressure was nearly two-tenths of an inch below normal, with an excess of northerly winds, showing that this station was well under the influence of the Pacific low-pressure area.

At Cape Virgins on the Atlantic side of the Straits of Magellan pressure was slightly in excess of the normal, this excess becoming more pronounced at South Georgia and the South Orkneys. There is little doubt that this unusual pressure distribution would greatly increase the activity of the oceanic circulation through the increased strength of the winds in high latitudes to the south and southwest of Cape Horn.

In July and the two following months the South Georgia observations show a continuation of the abnormal conditions noted in June, viz, a pressure higher than the same parallels in the west, but as the barometer fell at the South Orkneys the Weddell Sea was the theater of cyclonic activity, the atmospheric conditions in the vicinity of Graham Land and the South Shetlands being very

disturbed. It is of interest to note that July at the South Orkneys was 12°6 colder than June, while at South Georgia temperature fell only a tenth of a degree, the rapid fall at the southern station being due to continental conditions occasioned by the freezing of the sea. It is not necessary to go into a detailed description of the meteorology of the various months, but it may be noted that in December pressure, temperature, and sunshine were in excess of the normal at the South Orkneys, and below the average at South Georgia, where the barometric pressure was lower than at the southern station.

The values for the year show a normal pressure at the South Orkneys, and a slight excess at South Georgia, due to the prevalence of anticlyclonic conditions in winter. Temperature, while hardly a degree above the normal at South Georgia, was 3° in excess of the mean at the South Orkneys. As the winds were normal as regards direction, the high temperature at the southern station was not due to an increased frequency of warm winds blowing from lower latitudes, but to the unusual absence of pack ice from the Weddell Sea area. In both stations there was a large precipitation, the year being the wettest yet recorded, but heavy gales were few, in marked contrast to the Cape Horn region, where exceedingly disturbed conditions predominated.

# CHAPTER VI.

## TIERRA DEL FUEGO AND THE ARCHIPELAGO SOUTH OF MAGELLAN STRAIT.

**General remarks.**—The archipelago, which constitutes the southern extremity of America, consists of one large island, four others of a moderate extent, and numerous smaller islands and rocks. The shores are intersected by deep but narrow arms of the sea, on the sides of which rise the mountains, with their summits covered with snow the greater part of the year.

**Aspect.**—The northeast coast, generally cliffy, is broken by San Sebastian Bay, which affords good anchorage.

From the Strait of Le Maire to Barbara Channel there is a range of high mountains. South of this range is a long extent of broken land intersected by large and small sounds and bays. There is a boat passage from the eastern entrance of Beagle Channel to Week Islands, without being once exposed to the outside seas.

**Kelp.**—With daylight and clear weather a vessel may close the shore without risk, because the water is invariably deep and no rock is found which is not so marked by kelp that its position is as clearly indicated as though marked by a buoy. There is sufficient water for the largest vessels on any part of this coast by avoiding the kelp. Although kelp grows in some places from a depth of 30 fathoms, and many of the beds may be passed over in safety with not less than 6 fathoms of water, still kelp is always a sign of danger, and until the spot where it grows has been carefully examined it is not safe to pass over it with a vessel.

It is perhaps well to point out that kelp not attached to rocks floats on the water in heaps, whereas kelp attached to rocks streams away level with the surface, whilst the leaves give an occasional flap.

**Weather, winds, and climate.**—Except the lengthening of the days, there is but little to mark the succession of the seasons. In August, the coldest month of the year, the mean temperature is about 38° F., the thermometer ranging from 15° to 50°. In January and February, the warmest months, the mean temperature is about 50°, the thermometer ranging from 35° to 60°. Snow, sleet, and hail are abundant during the winter months, and may be expected upon at

least one day in two; even during January and February there will probably occur three or four days marked by their appearance. A day without rain is rare at any season.

It may be said that throughout the summer, especially January, the normal condition of the weather of this region is stormy. Calms are rarer than at any other period of the year, and the mariner may rely upon encountering at least one heavy squall every four or five days.

As the sun declines toward the northern horizon the atmospheric disturbances become less intense and less frequent. The month of March is generally stormy, but thereafter a period of relative calm succeeds; the west winds become less violent, and winds from east to northwest are sometimes experienced, by the middle of May warm, dry breezes from east and north are frequent, with now and then a day of bright sunshine. This continues until the month of July, when the weather becomes more and more precarious. In September and October the west winds regain the mastery, and heavy squalls, which are comparatively rare during the winter months, become more frequent and violent until January, which is generally the most tempestuous month of the year.

The meteorological conditions governing the sequence of weather in the neighborhood of Cape Horn, and the value of the barometer as serving to indicate approaching changes, have been made the subject of much discussion. Recent investigations have shown that these conditions are simpler than was supposed, and that the indications of the barometer, when properly construed, are reliable. The areas of low pressure, some of them of remarkable depth, make their appearance to the south and west of Tierra del Fuego. Their direction of motion is toward the southeast until the meridian of Cape Horn is reached, after which there is a tendency to merge to the northeast, an effect probably due to the high range of the Andes. The trough of lowest pressure is probably not far distant from the parallel of 60°. According to the law of storms, around the center of these depressions the winds circulate in the same direction as the hands of a clock, northerly, northeasterly, and easterly winds prevailing in their eastern half, southwesterly and westerly winds in the western. In the neighborhood of Cape Horn, however, the winds of the front or eastern half of the atmospheric depressions (winds from the north, northeast, east, etc.) are in many cases dissipated, or at least diverted from their normal direction as long as the cyclonic whirl is found to the westward of the high mountain ranges of Tierra del Fuego and southern Patagonia and their place taken by fine weather, with calms and light, baffling airs from all points of the compass. These are the almost invariable accompaniment of a falling barometer in the neighborhood of Cape Horn, although well-developed

easterly gales of force 9 sometimes occur, especially during the winter months. The western or rear half of these depressions exhibits all of the characteristics of the ordinary cyclonic storm. Either shortly before or shortly after the barometer has reached its lowest point the observer, if his vessel be to the north of the storm track, will experience a shift of the wind to the northwest, followed later by shifts to the west and southwest. If he be to the south of the track, he will probably feel the wind come out directly from the southwest with great force.

Described in general terms, the weather conditions accompanying the greater barometric oscillations are as follows:

The sky fairly free of clouds, with light, variable breezes from the eastern quadrant; the barometer, probably slightly above the average (29.40 inches), but showing a tendency to fall, quickens its descent until a rate of 0.02 inch per hour is attained. The weather continues fine, sometimes for as much as several hours after the fall of the barometer has become plainly apparent, and until the column stands from one to two tenths of an inch below the mean. About this time the sky becomes covered from the northwest with a thick bank of grayish cirrus, which, at once rising from the horizon and descending from the upper atmosphere, covers the sky with a misty veil, through which the sun appears pale and dull. The mercury falls rapidly, sometimes attaining a rate of 0.05 inch per hour; at the same time light but increasing breezes from the north or northwest spring up, or else there is a calm lasting several hours. The fall of the barometer continues until the mercury reaches a point below 29 inches, when it ceases, and the storm bursts in all its violence. Almost simultaneously the rising of the barometer begins, and continues until the end of the squall, which almost always finishes from the southwest. The fluctuations of the barometer during the rise are sometimes extremely rapid, and are attended by squalls of great violence. Capt. Leyland, of the British bark *Talca*, states that on July 8, 1895, between 4 and 5 p. m., his barometer rose and fell and rose again four-tenths of an inch, during which time and afterwards the southwest wind blew continuously with force 12.

Areas of high pressure, around which the winds circulate in a left-handed or anticlockwise direction, make their appearance during the winter. Sometimes these highs are merely southeastern extensions of the main area of high pressure which covers the South Pacific from the Tropics to 40° south; at others they are local, forming rapidly and rapidly disappearing. Within such areas barometric pressures of 30.7 inches have been recorded. Simultaneous observations show that their center may lie as far south as 60°. They ordinarily last from 24 to 36 hours, and are attended by light winds with clear cloudy weather.

The persistent westerly and southwesterly winds which prevail along the usual track of vessels rounding the Horn are thus seen to be due either to the passage of areas of low barometric pressure south of that track or to the approach of areas of high pressure from the northward, and by applying the law, that when the observer stands with his back to the wind the center of the area of low barometer (in the Southern Hemisphere) will be on his right hand, we have the following connection between the rise or fall of the barometer and the direction of the wind:

With east, northeast, and north winds the barometer falls.

With northwest winds it ceases to fall and begins to rise.

With west, southwest, and south winds it rises.

With southeast winds, it ceases to rise and begins to fall.

The barometer off Cape Horn is lowest with northwest winds and highest with southeast. If it fall to 29 or 28.80 inches, a southwest gale may be expected, but it will not begin until the mercury has ceased to fall.

The changes of the thermometer are in general in the opposite direction to those of the barometer:

With east, northeast, and north winds the thermometer rises.

With west, southwest, and south winds it falls.

With a southeast wind it ceases to fall and begins to rise.

These rules are in no sense absolute, but represent average conditions; thus, the rise of the barometer during a southwest gale, as mentioned above, is liable to be interrupted by fluctations of one or two tenths of an inch. During the recovery from one of these fluctations the wind generally backs. It may be said that the distinguishing feature of the barometer in this region is that it is never stationary, but continually oscillating up and down with a rapidity unknown in any other portion of the sea.

It should be remembered that bad weather never comes on suddenly from the eastward, neither does a southwesterly or southerly gale shift suddenly to the northward. Southerly and southwesterly winds rise suddenly and violently, and must be well considered in choosing anchorages and in preparing for shifts of the wind at sea. The most usual weather in these latitudes is a fresh wind between northwest and southwest, with a cloudy, overcast sky. A beautiful sunrise and forenoon are generally succeeded about midday by a gray and somber sky, the high cirrus coming down from the northwest. Clear nights, especially during the evening watch, are more frequent than clear days.

The average time consumed in passing around Cape Horn from 50° south latitude in the Atlantic to 50° south latitude in the Pacific is 20 days, individual voyages ranging from 7 to 67 days, the distance sailed being about 1,300 miles. This wide range admits

of two conclusions: First, that the weather in the neighborhood of the cape is extremely variable; second, that it is possible by adapting the courses sailed to the weather encountered, to materially shorten the time of the voyage. Maury, in his sailing directions, recommends keeping close under the land, in the face of the southwest gales and the strong easterly current which sweeps around the cape. The advisability of this was doubted at the time, Capt. Bailey, of the U. S. S. *St. Mary*, remarking in a letter to Maury: "So fully convinced am I of the truth of my experience, that I would advise ships, after passing the Straits of Le Maire, having a northerly wind and a falling barometer, to stand on a wind to the southward, confident of the wind's direction, so long as the mercury tends to fall. If it reaches a minimum somewhat below 29 inches, and a calm ensues, equally to be certain of a 'southwester,' and to be in a position if possible to profit by it." Later investigations have justified this recommendation, and have furthermore shown the probability of encountering favorable easterly winds in the region of 60° south. Westerly winds alone are unfavorable for a westward-bound ship; with other winds she is enabled to make fair progress. The navigator should therefore see that, when his barometer indicates the approach of an area of low pressure, he avoid the northern half of it, sailing around the depression by the south; and, in general, whenever headed off by west or northwest winds, to seek higher latitudes rather than lower. As a whole the weather may be said to be rather in a constant state of change than constantly stormy, the westerly gales themselves seldom blowing steadily from one point, but rather constantly hauling to the northward or southward. To make progress through such weather requires watchfulness on the part of the navigator, to be on hand to take advantage of every favoring change.

**Fogs** are rare on the coast of Terra del Fuego and in the vicinity of Cape Horn, but thick, rainy weather prevails, with strong winds. The sky, even in moderate weather, is generally overcast and cloudy, a clear day being a rare occurrence. The fogs are not uniform, being dense only in patches. They are more frequent west of the cape than east of it.

**Lightning and thunder** rarely occur except in very bad weather, when violent squalls come from the south and southwest, giving warning of their approach by masses of clouds. These storms are accompanied by snow and hail of large size.

**Cape Horn current.**—There is a continual current setting toward and along the southwest coast of Tierra del Fuego as far as Diego Ramirez Islands. Thence the current takes a more easterly direction, setting around Cape Horn toward Staten Island. At a distance of 10 or 12 miles south of Cape Horn its direction is to the east-

northeast, with a velocity of about 1 knot per hour. Near the land, particularly projecting capes and detached islands, the current is strongest, reaching its greatest strength with westerly winds and becoming almost insensible with easterly winds. It sets rather *from* the land.

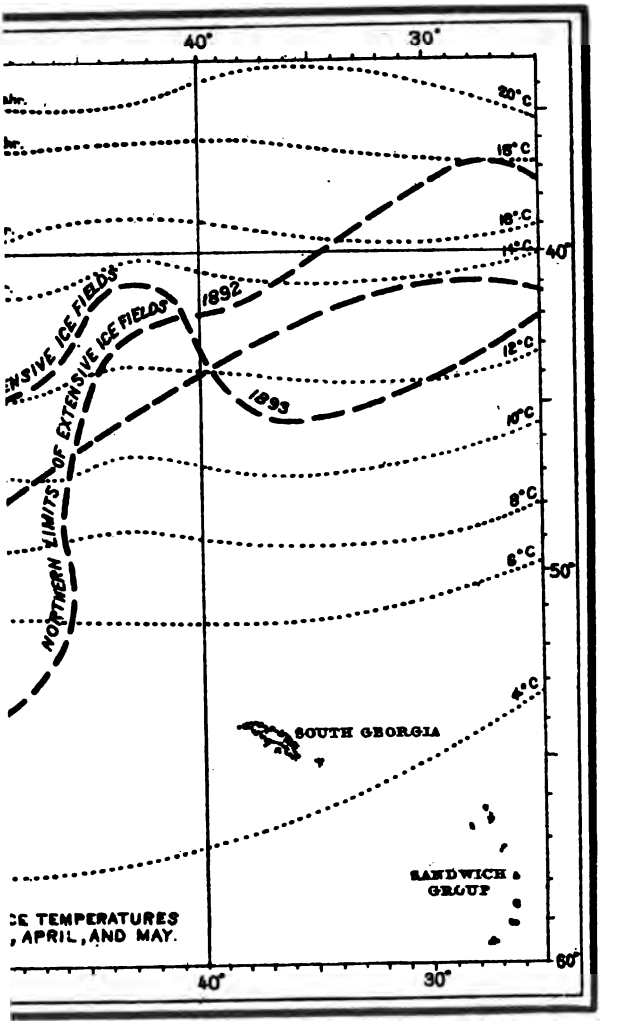
In the waters between Cape Horn and South Shetland the easterly motion of the sea is produced by the prevalence of the westerly winds; and although the direction of this current is sometimes much to the north as well as to the south of east, the deviation in all probability arises from the prevalence or greater strength of the northwest or southwest winds, as it has been generally remarked that the deviation of the current from the east toward the north or south was in accordance with the prevalence of one of these winds over the other.

A strong current sets at times along the outer coast of the Hermite Islands and through St. Francis Bay, which divides Horn Island from the rest of the group, varying from ½ to 2 knots, according to the wind and tide; and in the bay changes its direction with the change of tide.

In the channel between False Cape Horn and the Hermite Islands a current is found setting into Nassau Bay, and rather toward the Hermite Islands, at the rate of 2 knots, with the flood tide, and about ½ knot with the ebb. As this current sets rather toward West Cape, a good berth must be given to it in passing.

The currents between Cape Horn and Cape Pillar are by no means regular; sometimes with a strong wind and flowing tide they run 2 knots or more, at others they are hardly worth notice. During the survey the current was never found to set to the westward at any time of tide or with any wind.

**Icebergs.**—Ice in the form of bergs and floes is to be found throughout the year in the southern part of the South Atlantic Ocean, although it is impossible to give a general description which will hold good for any one year, as both the quantity of ice and the region in which vessels are liable to encounter it vary between wide limits. It frequently happens that one or more years may elapse during which the sailing route around Cape Horn will be apparently free from ice. Such was the case throughout the period covered by the years 1870–1878, with the exception of a few bergs seen far to the east of the Falkland Islands during the winter of 1875. On the other hand, at long and irregular intervals the number and size of the bergs become so enormous that vessels northeast of the Falklands are compelled to forsake the ordinary homeward-bound path for a more westerly route. This was the case during the year 1832, again in 1854, and notably so during the years 1892–93.


40°
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60°
1892
1893
NORTHERN LIMITS OF EXTENSIVE ICE FIELDS
SOUTH GEORGIA
SANDWICH GROUP
CE TEMPERATURES
, APRIL, AND MAY.

As given by the most reliable authorities, the mean ice limit for this region runs northeastward from Cape Horn through latitude 50° south, longitude 52° west, as far as latitude 42° south, longitude 35° west, the occurrence of ice north of the fortieth parallel being rare. The accompanying chart shows this average limit, as well as the limits according to the reports received by the United States Hydrographic Office, of the numerous ice fields encountered by mariners in those waters during the exceptionally severe years of 1892 and 1893. All of these reports agree in describing the icebergs seen during these years as colossal in height and extent, and herded so closely together that any attempt to force a passage through the main body of the drift was attended by grave danger, many vessels being more or less damaged by collision and at least two lost.

During the month of April, 1892, the bark *Colby*, in sailing from 54° south, 43° west to 44° south, 33° west, encountered almost continuous ice. Throughout June, July, and August following ice in an almost compact mass covered the area included by the parallels 40° and 45° south, and the meridians 30° and 40° west; beyond 45° west the ocean was practically free from ice, a single vessel—the ship *Drumcraig*—reporting ice west of this meridian December 29, 1892. The statement of the captain of the *Drumcraig* is as follows:

"December 29, in latitude 49° 34′ south, longitude 45° 53′ west, a large ice island appeared ahead, about 12 miles distant. Hauled ship to the wind and stood south, being unable to weather the north end of it. At noon found more ice and several large detached bergs ahead. Wore ship and stood west-northwest, the wind having shifted to southwest. The large island was fully 300 feet high and 25 or 30 miles long, extending as far as we could see. At 6 p. m. sighted two more large bergs bearing northeast. The deck thermometer stood at 41° throughout. At daylight the next day kept away to the north, and at 10 a. m. got close in among more ice—in all, nine large bergs, the northernmost berg being like an island, the north end of which we were unable to see. At 4 p. m. hauled out to the westward for the night, and the next day, in latitude 47° 25′ south, longitude 46° 15′ west, kept to the westward and saw no more ice."

At the close of February, 1893, the area of extensive ice fields had taken a roughly elliptical shape, extending from 45° south, 33° west, to 52° south, 52° west, and about 300 miles in width from north to south. The reports show that the individual bergs had spread to the westward far beyond the ordinary limits. Thus the *Afon Law*, May 6, 1895, saw three bergs in latitude 46° 50′ south, longitude 59° west, and the ship *Dechmont*, on the same date, one large berg in latitude 45° 50′ south, longitude 58° west.

In December, 1893, reports of ice again became frequent over a belt 200 miles in width and extending from 51° south, 47° west, to 42° south, 41° west, thus considerably to the north and east of the position of the main body during February, March, and April. These reports generally record the appearance of two or more bergs. The final chapter in the history of this extraordinary field of ice is given in the report of the master of the brig *Dochra:* "On April 30, 1904, latitude 26° 30′ south, longitude 25° 40′ west, observed a piece of ice 12 feet long, 4 feet wide, and 4 feet high. It was very white and seemed to be perforated. We passed quite near it. The sea was smooth and several people saw it."

In each case of their occurrence it has been noted that these vast fields of ice both appear and disappear with great suddenness. The absence of reports in the neighborhood south of Cape Horn shows that if these bergs did come from a point to the westward, they must have followed a path south of the ordinary course taken by vessels. It is, however, probable that their origin could be traced to some point to the southward, probably Graham Land.

Ice in the immediate vicinity of Cape Horn itself is rare, although isolated bergs are sometimes seen in the region south of the fifty-fifth parallel and west of the seventieth meridian. The year 1868 was an exception to this. In that year, east and west of Cape Horn from longitude 60° west to 87° west vessels encountered many ice islands and bergs, some of them of great height. It is noted that during that year (1868) no ice was seen northeast of the Falklands.

The chart of ice limits also gives for the months of March, April, and May the isotherms or lines of equal temperature of the surface water. These, however, are of doubtful value to the navigator in announcing the proximity of ice, as practical experience has shown that the temperature of the surface is little affected thereby. The report of Capt. McMillan, of the ship *Dudhope*, is especially interesting in this connection:

"Careful thermometric observations of air and water were regularly taken, but our approach to ice, always from windward, was not once indicated by any appreciable change of temperature, in either air or water. On passing to leeward of the bergs, a fall of a few degrees was generally observed in the air. On one occasion we passed within 200 yards of a berg, and found the temperature to be the same there as at several miles distant. This would go to show that in thick weather, or in any other, even temperature and thermometer at normal height should not be accepted as immunity from ice. Care and a most vigilant lookout are the only reliable safeguards. To depend on the thermometer would mean disaster, as I am convinced that a ship would be too close to the ice to extricate herself by the time the thermometer would indicate its presence."

**Soundings.**—Soundings extend to 30 miles from the coast. The depth of water varies from 60 to 200 fathoms, with a bottom of fine white or speckled sand, between 10 and 20 miles from the land. From 5 to 10 miles distant the average depth is 50 fathoms, though varying from 30 to 100 fathoms, and in some places no bottom at 200 fathoms. Inside of 5 miles from the coast the soundings are very irregular, generally less than 40 fathoms, but in some places deepening suddenly to 100 fathoms or more, while in others a solitary rock rises nearly to the surface of the water. In the large sounds inside the seaward islands the water is much deeper than on the outside.

An outer bank of soundings extends along the whole coast and appears to have been formed by the continued action of the sea upon the shore, wearing it away and forming banks with its sand. There is much less risk in approaching this coast than is generally supposed. East of Cape Horn the water is not so deep as to the westward, neither is the land so high.

**Anchorages.**—Opposite to the eastern valleys, where the land is covered with wood, and water is seen falling down the ravines, good anchorage is generally found. These valleys are exposed to heavy squalls, which come from the heights. The best of all anchorages on this coast is where good holding ground is found on the western side of high land, and protected from the seas by low islands or other barrier. It never blows so hard against high land as from it.

Where the land is composed of sandstone or slate, anchorages abound; but where it is of granite it is difficult to find soundings. The difference between the two can be told by the latter being very barren and rugged and of a gray or white appearance, while the former are dark colored and have smoother outlines and are generally covered with vegetation.

Between the islands, where there is no surf or swell worthy of notice, the water is deep and the bottom irregular. A small vessel may run among the islands in many places and find good anchorages, but she runs into a labyrinth from which escape may be difficult and, in thick weather, dangerous.

Off the northeast coast the soundings are regular, and good anchorage may be found near the land on any part of the coast during westerly winds.

**Natives.**—The natives of Tierra del Fuego are known as Onas. They appear to be an intermediate race between the large-sized Patagonians and the stunted Fuegians. They have no canoes and live largely on the produce of hunting.

Instances have come to light of shipwrecked mariners being deterred from landing on the islands of Tierra del Fuego and in the neighborhood of Magellan Strait on account of the hostility of the

natives. Mariners are informed that they can trust the Yahgans, natives of the southern channel, to conduct them to mission stations or settlements in the archipelago, where they can obtain assistance.

On the other hand, the Alacalufs, or natives of the Patagonian channels, who occasionally cross the strait to the northwestern channels of Tierra del Fuego, are aggressive and treacherous; but, however great their number, they will not attack a group of three or four persons, especially if they are aware that these persons possess firearms or implements resembling them.

There are in the Fuegian Archipelago many inhabited places. Amongst those permanently occupied in the eastern islands are the cattle stations of Lenox, Nueva, Picton, and Navarino, and in the western part the mining works, which are occupied during part of the year, on the Noir Islands, and at Diego Ramirez and other places.

Native settlements appear at various places from time to time, but these must not be regarded as permanent, it being likely that the natives move on when food becomes scarce. Smoke will signal Indians if in the vicinity.

**Mission stations** are located at Rio Douglas, Douglas Bay, southwest coast of Navarin Island, and at Ushuwaia, on Beagle Channel, Tierra del Fuego. There is also a settlement at Harberton, near the east end of Beagle Channel. The Rio Douglas station is located about one mile up the Douglas River, on its left bank. There is no longer a settlement at Tekenika Mission station.

**Shipwreck.**—Should a vessel be abandoned anywhere in these waters, all possible endeavor should be made to preserve the boats, owing to the extreme desolation of these parts and the impossibility of traveling overland. From any part of this region, either east or west of Cape Horn, boats should make for Rio Douglas mission station, unless they start from the eastward of Barnevelt Island, when Harberton should be their objective point, providing the wind is favorable.

If cast away, mussels may be found, but can often be obtained only in pleasant weather; also kelp and birds' eggs in season. In the woods near the coast a round, yellow, mucilaginous, sweet-tasting fungus may be found on the branches of the trees, which is good to eat, and in their season a few berries may be gathered. Water is plentiful on practically all of the larger islands.

### PASSAGES—EAST TO WEST.

Steam vessels, bound from the Atlantic Ocean to the Pacific, pass through Magellan Strait. The passage is described in Chapter VII.

**Sailing vessels.**—After passing the entrance of the Plata River, keep within 100 miles of the coast, on account of meeting with strong

westerly winds and smooth water. An easterly gale never comes on without ample warning.

If intending to call at the Falkland Islands, endeavor to get soundings off Cape Corrientes, or as soon as possible after passing the parallel of 39° south, and keep on the edge of the bank. If a direct course be attempted, there is danger of being driven to leeward of the islands by the frequent southwesterly winds.

If bound to Magellan Strait, or around Cape Horn, make the land to the southward of Cape Blanco, which lies 320 miles north of Magellan Strait, and keep it on the horizon until Cape Virgins is sighted or passed.

**Through Magellan Strait.**—Few sailing vessels pass through Magellan Strait, but it has been done. During the Klondike rush, a number of Gloucester fishing schooners, drawing probably about 14 feet, made the passage of Magellan Strait to the westward successfully.

Capt. Stokes, who surveyed this region, says: "When not desirous of visiting the Falkland Islands, a passage around Cape Horn may be avoided by going through Magellan Strait about half way, or as far as Magdalen Sound or Barbara Channel. By either of these the vessel may pass into the Pacific 200 miles to the westward and northwest of Cape Horn."

But, unless under some special circumstances, this route would be hardly advisable. Between Dungeness and Broad Reach are a number of dangerous shoals; in the Narrows the rise of tide is very high, and the tidal currents run with great velocity, as high as 8 knots having been reported; and no sailing vessel should attempt their passage without a commanding wind and a fair current.

**Through Le Maire Strait.**—Authorities differ as to the advisability of passing through Le Maire Strait, although by so doing it is possible to save the time employed in beating 60 miles, generally dead to windward. The difficulties attending this passage are the tidal currents, the danger of becoming becalmed under the high coasts, and the williwaws, or sudden squalls, which sweep down the canyons on the western side. Careful consideration of a large number of logs tends to show that these dangers have hitherto been exaggerated, and that during clear weather the strait offers a fairly safe route when proper precautions are taken. The navigator should plan to be at Cape San Diego at the beginning of the ebb tide, which sets toward the south through the strait, and easterly along the north coast of Staten Island and Tierra del Fuego. The best way is to make the land westward of Cape San Diego. Three Brothers Mountains form a good mark, and the shore is free of outlying dangers. When a southwest gale is blowing the vessel can lie to under easy sail in smooth water, and when the wind shifts to the

northwest a good run may be made before the wind is again in the southwest.

The entrance to the strait is generally approached with a northerly or westerly wind, which, during the flood tide, tends to produce a heavy cross sea. The ebb tide begins at the time of new and full moon, in the neighborhood of 7 o'clock, or about three hours after high water ashore.

It is unwise to approach Cape San Diego too closely, and the course should be held if possible through the middle of the strait. Capt. Fitzroy, R. N., who surveyed this strait, seems to think there is neither risk nor difficulty in passing through it; the chief danger is the failure of the wind. Capt. Berry, of the American bark *Mohican*, has made, since 1858, 23 voyages to the westward around Cape Horn, 22 of them through Le Maire Strait. In 1882 he beat his vessel through under reefed topsails. The passage of the strait should, however, not be attempted when there is any liability of encountering a southwest gale upon emerging, as under these circumstances it will generally be necessary to put back and round Cape St. John. For this reason the barometer should be carefully watched in approaching.

A recent comparison of 32 passages to the westward around the Horn made by certain vessels following the outside route, and by others simultaneously passing through the Strait of Le Maire, showed the latter to have an average advantage of two days seventeen hours from 50° south in the Atlantic to 50° south in the Pacific.

**East of Staten Island.**—At present the large majority of vessels round Cape St. John, where the only danger to be avoided is the tide race. Off Cape St. John a heavy tide rip extends for a distance of 5 or 6 miles or even more to seaward during the flood tide. When the wind is strong and opposed to the tidal stream, the overfalls are overwhelming and very dangerous, even to a large and well-found vessel. Seamen must use every precaution to avoid this perilous area.

Standing to the westward after passing Staten Island, the vessel should be kept on the starboard tack, if the westerly wind holds, until latitude 60° south is reached before attempting to run down the longitude; after crossing the meridian of 82° west, stand to the northward.

On the parallel of 60° south some authorities believe that the wind from the eastward prevails more than from any other quarter.

**Through Nassau Bay.**—In some cases it might be preferable to work a sailing vessel through Nassau Bay and stand out from False Cape Horn, instead of making westing in the open sea, as is usually done. The water is comparatively smooth, and an anchorage may be obtained at night either in Goree Road, North Road, or Orange

Bay. There is less current through the bay than in the offing near Cape Horn.

Capt. Stokes says of this passage: "Ships having to visit the Falkland Islands, in proceeding from the Atlantic to the Pacific during the summer and most stormy months may avoid Cape Horn by making the circuit of Nassau Bay, where there are good anchorages, and a convenient stopping place near its southern entrance, 30 miles to the northwest and to windward of Cape Horn. In this bay a vessel should wait until the wind has a good deal of northing, which, if accompanied by a low barometer (29), will probably be the commencement of a semi-revolving gale, and will carry her far enough to the westward, by the time the wind has shifted to that quarter, to make safe another anchorage under Noir Island. This is an easy landfall; and here a westerly gale may be passed safely in smooth water, and a good position secured for another start when the weather permits." (Noir Island, p. 266.)

**Caution.**—In Nassau Bay the compasses are said to be much affected; they become very sluggish, and might cause serious errors if not carefully and constantly attended to.

**Rounding Cape Horn.**—June and July are perhaps the best months for making a passage to the westward, as the wind is then often in the eastern quarter, but the days being short and the weather cold make these months unpleasant. April, May, and June are preferable, fair passages having been made in these months by keeping nearer to the land and sighting Diego Ramirez Islands. August and September are bad months, heavy gales with snow and hail occurring about the equinox, but good passages are said to have been made at this season by going as far south as 60°.

**Cape Horn, northward.**—Sailing vessels, after rounding Cape Horn and bound to ports on the west coast of South America, should, when westward of the meridian of Cape Pillar, or 75° west, take every opportunity of making westing until the meridian of 82° or 84° west be reached, thence steer direct, or as nearly so as is consistent with making use of the steady winds which prevail in the offing, for the intended port, being careful not to get to leeward of it on approaching the land.

If bound to the Gulf of Panama keep about 60 miles from the coast north of Guayaquil and, after crossing the equator, steer for Galera Island, at the same time taking care, especially in the dry season, to stand inshore with the first northerly winds. By so doing vessels will most probably have the current in their favor along the coast; whereas by keeping in the center or on the western side of the gulf, a strong southerly set will be experienced.

After making Galera and clearing the San Jose Bank the navigation between the Perlas Islands and the main is clear and easy, with

the advantage of being able to anchor should the wind fail and the tide be against the vessel. As a rule this passage should be taken, but with a strong southerly wind the navigator is tempted to run up the bay, in which case he should still keep on the western shore of the Perlas Islands, where anchorage and less current will be found should the wind fail, an event always to be expected in these regions.

**Eastward.**—December and January are the best months for making the passage to the eastward, sighting Cape Horn and the Falkland Islands in order to keep clear of ice, but that passage is so short and easy that it hardly requires a choice of time.

The most favorable route for sailing vessels bound north in the Atlantic is to cross the parallel of 50° south in about 50° west, and the parallel of 30° south in about 30° west, and then make northing along the meridian of 28° west until the southeast trade is met.

### DIRECTIONS FOR MAGDALENA, COCKBURN, BRECKNOCK, POMAR, O'BRIEN, NORTHWEST ARM AND BEAGLE CHANNELS.[1]

**Navigation.**—The following rules should be followed in navigating these waters:

First. Use the compass continually, even in cases where its use appears unnecessary either on account of the shortness of the course or clear weather, as its use will serve to verify the position on the chart and will afford greater exactness.

Second. Keep the location of the vessel constantly on the chart when abeam of all points, islands, bays, etc., noting the time and the reading of the log, in order to be certain of the position if overtaken by thick weather.

Third. Except in the localities indicated, a midchannel course should be maintained as these channels have not been well sounded, and for this reason a sharp lookout should also be kept. A midchannel course will avoid confusing the view, which is liable to result in coasting along the shore.

Fourth. Avoid patches of kelp and keep off of the points on account of the liability of encountering shoal water.

Fifth. Navigation at night is not recommended except in certain special localities, because if overtaken by heavy snow a vessel might get into serious danger.

Sixth. On account of the limited amount of daylight in winter, due to the short days, a vessel should not get under way before selecting the next anchorage, bearing in mind that there are few anchorages suitable for large vessels.

Seventh. If overtaken by a heavy fall of snow, which comes down in vertical, thick flakes, the engines should be stopped and the course

[1] The directions for the above channels of Tierra del Fuego were compiled by the officers of the Argentine transport *Piedrabuena*, after a cruise in these waters in 1912–13, and published by the Hydrographic Office of Argentina in 1915.

taken up only when the weather clears, as that is an indication of a long continued snow fall.

Eighth. The passage by small vessels of Brecknock Pass will be easier if an early start is made, as at that time the weather is usually calm.

**Winds.**—The prevailing winds blow from between northwest and southwest, increasing in force from June to January and afterwards decreasing until May or June when there will be relatively calm weather. The winds interfere with navigation only in Brecknock Pass, from Cape San Isidro to Magdalena Channel, and in Desolate Bay when heading into it.

The mean annual force of the wind is about 12 miles an hour, varying in winter to 11 miles and in summer to 28 miles. Seventy-mile winds have been recorded.

**Rain, snow, and hail.**—The annual rainfall is about 6½ feet, as all seasons are equally rainy, and about one-fourth of this amount falls in the form of snow and hail; this total increases with the height of the land and at 1,600 feet the snow is perpetual.

**Clouds, fog, and thick weather.**—In general, in this region there are usually about 0.8 of clouds and it is more cloudy in summer than in winter. Fogs are not frequent, thick weather being produced by low clouds, in certain cases, or by the quantity of rain or hail in the summer or snow in the winter. The last condition renders navigation impossible, making it necessary to seek port or stop the engines. In summer it is of short duration, and it is seldom that the visibility is reduced to less than 1 mile.

**Tides and currents.**—The general rise and fall in this region varies between 4 and 8 feet, and the tides are very regular. In Magdalena Channel the flood current runs to the south, increasing in velocity opposite Anxious Point and Cape Turn, producing tide rips and whirls. In Cockburn Channel the flood stream runs toward the sea and its velocity is less, but strong tide rips are formed in the passages north and south of King and Fitz Roy Islands. In Brecknock Pass the flood stream runs to the eastward and its rate is less than the ebb, which runs toward the ocean, but is felt with any force only in the passage called Belgrano. In Desolate Bay and Whaleboat Sound the tidal currents are very weak. In Pomar Channel the flood stream runs to the east and reaches a velocity at the entrance of 4 miles an hour, but is less strong in O'Brien Channel, except opposite Guillermo Island. In Beagle Channel the flood sets to the east, but is very weak except in the narrows of Point Divide, where the stream produces tide rips and whirls.

**Icebergs.**—Large icebergs are rare in this region, but as there are some, lookout should be kept for them.

**Directions—From Punta Arenas to Ushuwaia.**—Leaving Punta Arenas, the navigation as far as Cape San Isidro should follow the route indicated on the chart, on which line the currents are not strong. But care should be taken in the vicinity of Guayrabo, Carreras, and Santa Anna Points, which are low and project into the strait, with small reefs extending from the two latter. This precaution should be taken in case of fog.

In the stretch of coast to Cape San Isidro are several anchorages which may be used if necessary, according to the state of the weather and the size of the vessel; in these ports the prevailing winds are from southwest to northwest.

Arriving at Cape San Isidro, which may be approached to less than ½ mile, as the rock which uncovers at low water and marked by kelp lies 400 yards from the cape, set course to leave Kelp Patch open two or three points on the port bow; this is marked on the chart with 3¼ fathoms and lies 3½ miles, 216° from Hillock Point, Dawson Island.

On this course and when about 5 or 6 miles from Cape San Isidro Cape Froward will open to starboard; bearings of this Cape and San Isidro Light will give a good fix.

**Magdalena Channel.**—After passing Kelp Patch change course to port for Magdalena Channel. Mt. Vernal, Periagua Islet, and Anxious Point and its islet mark the entrance; the best mark is this last island, which is visible most of the time, even in thick weather.

It should be noted that the bearings of Tierra del Fuego and the islands do not agree with those of Cape San Isidro and Cape Froward, but the points mentioned will serve to recognize the entrance of Magdalena Channel.

Once inside of the channel follow along the middle; soon Hope Harbor will be seen on the starboard side, the entrance of which is marked by a large vertical bare spot on the hill; soon afterwards, on the same side, Reese Islands will be seen in the entrance of Stokes Inlet. On the port side, at the foot and in the bay of Mount Hurt, two islands will be seen, the first larger than the second. From this point run parallel to the east coast of the channel to avoid the shoals of Sholl Bay, which lie north and south of Entrance Islets. Reaching the north point of Keats Sound, which is a large opening but little explored, from the south point of which a shoal marked by kelp extends one-half mile to the northwest, head to starboard, leaving on this side and not less than 1 mile distant the island 100 Fathoms or Cenaria, called this because the charts do not give it a name and lying near a 100-fathom sounding.

The entrance of Sholl Bay may be made from the north, passing near the coast of the Boqueron and leaving the north shoal to port,

between this and Entrance Island, or between the south shoal and the coast. The first two passages are preferable in proceeding either north or south, as the last has no advantages and caution is required to avoid the shoals.

Once past the 100 Fathom Island stand on a course toward the middle of the channel, leaving a little to port, if it is seen, the glacier at the end. To starboard will be seen the Labyrinth Islands and 4 or 5 miles farther on a large sound will open in which three glaciers of Mount Sarmiento appear. This mountain is rarely unobscured. From this position Cape Turn will be seen on the starboard bow, and Mount Pyramid, of regular outline, will be seen ahead. Between Sholl Bay and Cape Turn, Transition and Drew Bays lie on the west coast.

**Cockburn Channel.**—At Cape Turn Magdalena Channel ends and Cockburn Channel commences and runs west-northwest during the first part of its course. Around Cape Turn King Island will appear; head for it, or set course for it if it be obscured, and when within 1 mile of it Fitz Roy Islet and Barrow Head will appear just to the right of the island. Either of two courses may then be followed. The passage to the south of the island is narrow, and the effects of the currents are more strongly felt, necessitating close attention to the steering. The northern passage is preferable for a large vessel. Taking the north passage stand parallel to the line through King and Fitz Roy Islets, taking care to avoid the rock shown on the chart between Fitz Roy Islet and Park Bay; it should be left to starboard. As King and Fitz Roy Islets are surrounded by clear water they may be approached with prudence; a rock is visible more than 1 mile northeast of Fitz Roy Islet. Standing parallel to King and Fitz Roy Islets, Barrow Head will be seen over the bow, and this must be left to starboard after passing Fitz Roy Islet. Prowse Island will be to port and the course lies between this island and the southern point of Barrow Head. From this position Port Barrow (Villarino) will be seen to starboard around the nearest southern point of Barrow Head. This port will be easily made out when abeam by two waterfalls.

Between Cape Turn and Port Barrow, in the north coast of Cockburn Channel, Warp Bay lies near the cape; a little farther west Stormy Bay opens, having in its center a peninsula which divides it into two parts and which looks like an island from the outside; farther along and opposite Fitz Roy Channel is Park Bay which opens into Mercury Sound. On the south side of the channel, opposite Stormy Bay, is Port Ideal which has an islet in its entrance.

With Port Barrow abeam, set course to pick up Kirke Rocks, and as Enderby Islands are visible beyond the rocks even in thick weather, their tops will appear, showing a characteristic dip; these

islands should be passed close-to. Kirke Rocks may be passed on either side, but it is preferable to pass to the north of them, although both passes are clear, for in that position Cockburn Channel opens clearly, and by the south channel, toward Brecknock Peninsula, the coast of Tierra del Fuego presents a series of openings and points which have not been examined, and these should be given a good berth.

Leaving Barrow Head, Dyneley Sound will open to starboard, with Baynes Islands and the entrance point of Eliza Bay; then will appear the Duntze Islands, which with Enderby Islands form Adelaide Passage, leading to Barbara Channel. On the port hand, among the points and openings mentioned, Bluff Inlet, with Ports Tanteo and Saco, is the best known and lies south of Barrow Head in the Prowse Islands.

Passing Kirke Rocks, follow the middle of Cockburn Channel, leaving to starboard the Enderby Islands and then Henry Island, of the Magill Group, on the same side. In this group will be found several harbors, and Mount Skyring, which is very prominent. On the south coast of the channel are a large number of openings, of which the best known are Brujo Sound, with Port Alegria and Chasco Sound.

**Occasion Channel.**—Being abeam of Henry Island, if intending to pass through Occasion Channel, stand toward the coast of Brecknock Peninsula, which may be recognized lying under a point of medium height and characteristic form. When within three miles of the entrance of Occasion Channel, there will be seen Cape Negro, Rompientes Rock, which lies to port of the entrance of the passage, Aguirre and Astrea Islands, and Leon and Tussac Rocks, the latter being the shape of a haycock. Following along the coast of Brecknock Peninsula, Occasion Channel will soon open; Negro Rock should be left to starboard in entering the passage.

During heavy weather from the southwest, which is one of the difficulties of this passage, and in which a heavy sea is usually met, it would be well to stand to windward and then head away for the entrance between Rompientes and Negro Rocks, bearing in mind that in the latitude of Miguel Point, and about 3½ miles from it, is Charcot Rock, which shows at low water. Although the majority of navigators have seen no breakers in this vicinity, it would be advisable to observe caution hereabouts.

Entering Occasion Channel midway between Rompientes and Negro Rocks, and having passed the line between them, stand on the line between the first rock mentioned and Redonda Islet, which will appear against the slope of Cape Negro; this line leads clear of the kelp on both sides of the passage. Lagartija Island, which is long and flat, will soon be seen in the middle of the channel; pass halfway

between it and Redonda Islet and then stand near to Cape Negro to avoid a dangerous bank off the cape, which is always marked by kelp. Passing between the shoal mentioned and Cape Negro, work gradually toward the south coast, avoiding the banks which extend off the cape; then stand parallel with the south coast, passing in midchannel between the northern Pajaros Islet and the south point of the north coast. In Occasion Channel is Port Luz opposite Cape Negro.

**Brecknock Pass.**—As before stated, being in a position abreast Henry Island, if it is desired to go through Brecknock Pass, stand on until Occasion Channel is abeam when bring Astrea Island a little on the port bow, bearing in mind the position of Charcot Rock, which may be left on either side. Once the channel is well open between Aguirre and Astrea Islands keep in midchannel.

Standing down the middle of Brecknock Pass, London Island will appear on the starboard side, with its peak of Mount San Paulo, and separated from Astrea Island by a narrow channel; on the port side and almost opposite the peak is the outlet of Occasion Channel. Navigating either of these passages a vessel should keep in midchannel, as both shores are foul and bordered with kelp, and several rocks extend from Aguirre Island.

Continuing the course, Nelson Islands will soon appear on the port side, from which rocks extend, marked by kelp, and nearly at the end of London Island an islet will be seen; Capea Islets and Sidney Island, which, with London Island, form Pratt Pass, will be seen ahead, and on the port bow Georgiana Island, with various unnamed islets.

Reaching Nelson Islets, which may be recognized during thick weather sometimes by Horacio Peak, southeast of Mount San Paulo. or by the islet which lies off London Island, change course to port, taking care to avoid the kelp off Nelson Islets by heading for the northwest slope of Georgiana Island, which is known as Vuelta Point. From Nelson Islets stand on the line between Horacio Peak and Vuelta Point, which will lead clear of the dangers on both sides. Between Brecknock Channel and Georgiana Island are several anchorages, of which Port Townsend, in Pratt Pass, is the most important.

Passing Vuelta Point, which may be rounded close-to, follow the middle of the channel, but in case of thick weather it is convenient to approach the shore of Georgiana Island, although one may stand close to the low point which projects from Brecknock Peninsula. With this point abeam a continuation of the channel will be seen, in which lie the Merry Islets, Macias Island, Mount Brecknock, on the island of the same name, and Basket Island, which appears ahead. Between Basket and Georgiana Islands is Cadiz Rock, which lies

inside the line between the farthest off-lying points of these islands and to starboard of the course.

From abeam of Cadiz Point, the north extremity of Basket Island, head to approach Brecknock Island near the most salient slope, which lies a little on the near side of Merry Islets; in this position will appear Cape Atracadero of Brecknock Island, which lies opposite the west end of Macias Island. Follow along the coast of Brecknock Island about 100 to 150 yards offshore, on a line parallel to Cadiz Point and Cape Atracadero, which appears to be clear, taking the pass known as Belgrano, by which Bevan Shoal, which lies halfway of the line between Merry Islets and Cape Atracadero, will be avoided.

There is also a passage leaving to port the shoal mentioned, but it is little known; besides, the coast of Brecknock Island has been passed close-to without encountering any dangers, for which reason it is recommended to leave the shoal to starboard; it is marked by kelp, which is difficult to see when there is any current. At low water there are 2½ fathoms over the shoal. It is intended to mark this shoal with a buoy.

Before reaching the Merry Islets, Basket Cove will be found on the island of the same name. Between this island and Macias Island are a number of rocks and breakers. After passing Cape Atracadero several rocks will be seen to port and opposite Edward Peninsula, between Macias and Marsh Islands; these should be left to starboard halfway between them and the peninsula.

**Entrada Island,** on which stands a good beacon, should be left to starboard, and when abeam of it or a little before, Desolate Bay will appear, in which will be seen Gorda, Burnt, Bruce, Direction, Iguala, Fresia, and Marsh Islands. From this point head for Direction Island, leaving it to starboard, and if it be not seen, between Bruce and Burnt Islands, set the course for it.

In Edward Peninsula there are in the same coast Port Chico, which opens from the channel, Ports Edward and Langois to the north of Gorda Island, and Port Estrecho in the same island. After passing Port Langlois the coast recedes to the north, forming large, unexplored entrances, among which lies Courtenay Sound. To starboard, after passing Entrada Island, is the opening of a large arm which extends toward the Pacific and permits the entrance of rough seas during bad weather; it contains a considerable quantity of rocks, islands, and breakers.

**Whaleboat Sound.**—Leaving Direction Islet to starboard, steer with slight variation of the course to pass between Burnt and Bruce Islands and enter Whaleboat Sound. Coming out of this passage Smoke Island will be seen to port lying south of Ladrones Bay and

forming with Burnt Island the anchorage of the latter name. Farther ahead Cape Longchase will be seen projecting toward the sound; this cape is very characteristic and visible much of the time during thick weather. The Middle Group and Fanny Point of Stewart Island, between which the course leads, will be seen dead ahead. In the Middle Group is Senal Island, a little island situated south of Mayor or Grande Island; the course lies between it and Fanny Point.

In case it is intended to take the channel south of O'Brien Island, stand on the same course until near Engano Point of Londonderry Island, whence steer toward its entrance; Guillermo Island will be seen against the land on the starboard hand.

In Stewart Island are various ports, the most important of which is Fanny, and in the eastern part of the Middle Group is Port Util.

In Londonderry Island are Isabel Bay, Port Engano, and La Rosa Bay. The second, which is the most important and most frequented, should not be headed for until well past the entrance points, so as not to confuse this with another entrance; the bay opens to the southwest and at the head of the port on the shore is a large rock painted with red lead and visible from outside.

**Pomar Channel.**—If it is decided to proceed from the Middle Group through Pomar Channel, although it is more convenient to follow O'Brien Channel, which is the most used, the only difficulty will be found at the entrance, where various islets surrounded by kelp appear to obstruct the fairway, but the channel is marked by two beacons, one on Pinto Point and the other on the north part of an islet; the passage lies between the two beacons, leaving on either side the little islets in the center. Care should be taken in the steering on account of the currents; otherwise follow the middle of the channel to the east part of O'Brien Island.

**O'Brien Channel.**—Entering the channel south of O'Brien Island between Guillermo Island and the rocks which extend from it, steer carefully on account of the currents; farther off and opposite the east extreme of Guillermo Island is a shoal of 5 fathoms marked by kelp, which should be left to starboard. Continuing between the groups of rocks which line both coasts, the vessel will pass Fantasma Anchorage, at the foot of the mountain of the same name, and beyond is Port Lagunas; Port Fortune, marked by a peninsula which appears from the channel as an island, will be passed on the starboard side.

When abeam of Americana Point, to follow Medio Pass head for Baja Island, beyond Timbal Grande Island, until the southern islet of the Timbales Chicos is abeam, passing halfway between Termino Islet and the coast of Timbal Grande, which appears to be clear.

**Northwest Arm.**—Leaving the Timbales, and with High Peak on the port beam, the route through the northwest arm leads north of Chair Island and the islets of the same name to the north of it, passing between the islets and the coast of Tierra del Fuego. Proceeding on the course after leaving Chair Island, there will be seen in the north coast a large entrance between two low points which form Port Garibaldi, and the course to be followed leaves this Port on the port hand, passing between it and Three Arms Bay. The entrance to this bay will be seen around a low point a little on the starboard bow, beyond which the northern slope of Gordon Island rises gradually from the water to a sharp peak. Beyond Port Garibaldi, in the north coast, are other large inlets and glaciers, and in the south coast are Volier Cove and Romanche Bay; the entrance to the last-named bay will be found opposite two glaciers in the north coast of the channel.

**Beagle Channel.**—Continue in mid-channel until the entrance of Beagle Channel is seen ahead, marked by Divide Island. At 2 miles from Divide Point, the view will comprise the island, which is long and of dark color, to the right of which appear two points, one beyond the other; the low point farthest to the right is Point Divide, and the point beyond is the west entrance point of Awaiakirrh Cove. The course leads between these points and Divide Island. When nearly up to Divide Island the glacier of Port Olla will be seen in the north shore. Steer in mid-channel in Divide Pass between the point and island of that name, taking care not to be swung around by the currents, which affect the steering until well into Beagle Channel. Continuing in mid-channel through the latter, Port Arena will be seen in the north coast just north of Awaiakirrh, and to the eastward of it Yendegaia and Lapataia Bays. In the center of Lapataia Bay is Round Islet, and opposite to it is the entrance of Murray Narrows with a number of islets east of the entrance. Between Yendegaia and Lapataia Bays, Peron Rocks lie nearly in mid-channel; these should be left to southward.

**Little Ushuwaia Pass.**—To navigate the Little Ushuwaia Pass proceed as follows: After leaving Whaits Islets, one of which lies well out into the channel and is difficult to see, head for the west point of the largest of the Bridges Islands, on which will be seen a beacon; this should be approached within a short distance, without going any to the north of it, in order to avoid the banks which extend south from Ushuwaia Peninsula, there being a sounding of 4½ fathoms at 400 yards from the islet north of the beacon.

When near the beacon above mentioned, change course a little to port and leave it about 400 yards on the starboard beam; with the beacon on the starboard quarter, head north on a line between this beacon and a similar beacon on the west side of the largest of the

Warden Islands, which island will be recognized by its two hills. This course will lead clear of the banks on either side, although some kelp will be encountered.

With the north end of Rabbit Island abeam on the starboard side and a black rock abeam on the port side, work gradually to starboard, passing between the island on which the beacon stands and a long, low island eastward of it. Casco Island will be seen a little on the port bow with a beacon on its eastern end; pass around the point of this island outside of the kelp and to the northward will be seen the buoy of a 2-fathom spot which lies a little more than ½ mile north of the last-mentioned beacon. When clear of this shoal, head for the anchorage.

**Directions from Ushuwaia to Punta Arenas.**—Leaving Ushuwaia Bay either of two passages may be used, the selection depending upon the size of the vessel, but the wider passage is not so well marked, and the Little Pass has been used by large vessels.

**Little Ushuwaia Pass.**—Leaving the anchorage, pass on either side of the 2-fathom shoal with its buoy, situated north of Casco Island, and leave Casco Island to starboard, passing outside of the kelp which extends from its eastern end, and head for the passage between the two other Warden Islands. Having passed between the above-mentioned islands, clear of the kelp which borders them, head gradually to port to pass between the 4½-fathom bank, which leave to starboard, and a 1¾-fathom bank which should be left to port, the latter situated at the northwest end of Rabbit Island. Farther on is a 4½-fathom shoal marked by kelp which should be left to port, and when on a line between the beacon of the western Warden Island and a similar beacon on the west end of the largest of the Bridges Islands, head for the latter beacon, which will lead clear of the shoals on either side of the course.

Approaching the Bridges Islands, keep the same course until 200 yards from the islet north of the beacon, then change course to starboard and pass the same distance from it to avoid the 4½-fathom shoal on the starboard hand. Kelp will sometimes be encountered on the above course, but this is attached to shoals outside of the channel.

**Beagle Channel.**—Leaving the Bridges Islands, stand down the middle of Beagle Channel, leaving Whaits Islets on the port hand; these islets extend well into the channel, and care should be taken in passing them, as the outermost is not easily seen. As far as Point Divide the channel is wide and may be navigated by compass in the middle after leaving the Peron Rocks to southward.

In the north coast, in the Ushuwaia Peninsula, is Port Golondrina, which is full of kelp; farther on, Lapataia Bay, with Round Islet in its entrance; between the last-named bay and Yendegaia

Bay is the boundary between Argentina and Chile, and 3 miles before reaching Point Divide is Port Arena. In the south coast, opposite the last of the Whaits Islets, is the entrance of Murray Narrows, and in the same longitude as Port Arena is Port Awaiakirrh.

When within 1 mile of the last-named port the Southwest Arm will appear ahead; the right of that opening the snow-capped Divide Peak will appear, just to the left of the end of the north shore. At 2 miles from Point Divide the Northwest Arm will open between Divide Island and Point, to the right of Divide Peak.

**Northwest Arm.**—Between Port Arena and Divide Island the course should be maintained in mid-channel or a little to the southward, as the coast is foul, and also in order to open the Northwest Arm. In passing between Divide Point and Island care should be taken not to be set about by the currents. There is no passage between Divide Island and the coast to the north, although at a distance it appears that a passage exists, but even in thick weather there is little possibility of confusing these passages if due caution be observed and the course held, in approaching, a little to the south of mid-channel.

Having passed between Divide Point and Island keep a mid-channel course. Just inside will be seen Port Olla and its glacier, in the north shore; farther on a series of glaciers begins, and opposite the two nearest and largest is Romanche Bay, in the coast of Gordon Island. Four or five miles west of this port is Port Voilier, beyond which the coast turns to the southward as far as Three Arms Bay.

In the north coast, almost opposite Port Voilier, are the openings of large bays whose entrances are obstructed by chains of rocks.

Opposite Three Arms Bay the channel is 3 miles wide, and soon Darwin Sound will be seen to port, formed by Gordon, Chair, and Darwin Islands; Port Huemul is situated in the northeast coast of the last-named island. In the north coast Port Garibaldi opens between two long, low points.

From a position about 2 miles from Chair Island two islets will appear off its north point; the course leads north of these islets. To the right of and beyond these islets Timball Grande Island will appear; beyond it Londonderry Island; and over the south point of the north shore Mount Fantasma, of O'Brien Island, will appear in the distance.

Approaching the Timbales, O'Brien Channel will be seen ahead and Pomar Channel to starboard, leading north of O'Brien Island. The Timbales Chicos will be seen against O'Brien Island under Mount Fantasma. Either of the channels above mentioned may be used.

**Pomar Channel.**—From the position above described, to pass through Pomar Channel, head to starboard between the Timbales

Group and the coast of Tierra del Fuego, keeping clear of both shores of the channel. Continuing in mid-channel, Ventisquero Bay will be seen to starboard and Americana Point, the east end of O'Brien Island, will be seen to port. A mid-channel course should be maintained through this channel.

The outlet of this channel appears obstructed by several islets surrounded by kelp; the passage leads between two beacons, one situated on Pinto Point and the other on the north part of an islet, leaving on either hand the little islets in the center of the passage. Care should be taken in steering on account of the effects of the currents.

After passing O'Brien Island stand toward Whaleboat Sound, taking care to avoid Jiminez Bank. Ports Ballenas and Ameida are situated in the north shore of O'Brien Island.

O'Brien Channel is a more direct route than Pomar, and is the one generally used, but Pomar Channel has the advantage of containing Port Ballenas, in which vessels of any size may anchor.

**O'Brien Channel.**—After passing Chair Islets, head for Timbal Grande, passing in mid-channel between the latter and Termino Islet; the shore of Timbal Grande appears to be clear and may be approached, leaving all the Timbales Chicos to starboard. The shore of Londonderry Island will appear ahead, and the course runs parallel to it; Condor Islet will be seen to starboard, and the wreck of the transport *Ushuwaia* lies northwest of it. O'Brien Channel will be reached when the east end of the island of the same name is abeam, and this channel should be navigated through the middle of its length.

When within about 1 mile of Mount Fantasma a dark island will be seen on either hand, with Mount Polux rising above the one to port, and soon after various groups of rocks will appear on both sides of the channel. Guillermo Islet will appear ahead when about 2 miles distant from it. It is a long, low island, and the course leads north of it.

After passing north of the 5-fathom shoal, marked by kelp, situated north of the east point of Guillermo Islet, the narrowest part of the channel will be reached, and close attention should be given to the helm, on account of the strong currents. At the entrance of Whaleboat Sound a chain of rocks borders the coast of O'Brien Island, the largest of which is Redondo Islet.

In the north coast of the channel between the Timbales and the west end of O'Brien Island, Emilia Cove is situated west of Golondrina Island, beyond which is Port Lagunas and Fantasma Anchorage, at the foot of the mountain of the same name. In the south coast is Port Fortuna, which is easily recognized by the point at its entrance which appears as an islet from the channel.

**Whaleboat Sound and Desolate Bay.**—With Redondo Islet abeam head for Port Engano, leaving it a little on the port bow, if proceeding through the sound, or else on the starboard bow if making for Port Engano. At about 1 mile from the above port, Fanny Point and the following islands of the Medio Group will be seen to starboard: Bruce, Senal, Grande, and Burnt.

When abeam of Engano Point change course to pass between Senal Island and Fanny Point of Stewart Island, whence, with a slight variation of the course, the vessel will be lead between Burnt and Bruce Islands, where Whaleboat Sound is left and Desolate Bay entered.

On the coast of Londonderry Island are La Rosa Bay, Port Engano, and Isabel Bay. Port Engano is the most important of these, and is easily recognized when standing to the westward, being marked by a large, red rock which is visible a long way off. In Stewart Island are several anchorages, the most important of which is Port Fanny.

North of Whaleboat Sound and opposite Engano Point, O'Brien Island terminates in Pinto Point, at the outlet of Pomar Channel. Farther westward in the north shore is a series of unexplored bays extending from the Middle Group to Cape Longchase, a conspicuous point which projects toward Whaleboat Sound, forming, with Smoke Island, a sound known as Ladrones Bay.

**Port Util** lies in the Middle Group, and between Burnt and Smoke Islands are the Burnt Island Anchorages.

Entering Desolate Bay between Burnt and Bruce Islands, keep nearly on the same course, leaving Direction Islet on the port hand, and passing at a greater distance north of Guala and Fresia Islands and a considerable number of rocks, islands, and breakers which lie between Stewart and Basket Islands. Between these islands is an opening to the Pacific, through which heavy seas enter during bad weather. To the north lies a series of islands and bays which are little known, as is Courtenay Sound, farther to the north.

**Brecknock Channel.**—After passing Direction Islet, head for Entrada Island, which will appear against the land to the left of Mount Brecknock. To the right of that peak is Port Chico, with Edward Peninsula farther to the north; and to the left of Entrada Island will be seen, in order, Cape Atracadero, Basket Island, and Macias Island. The entrance of the channel may be recognized by Gorda Island, Mount Brecknock, and Entrada Island, with its large beacon.

Leaving Entrada Island on the port hand, there will appear between Macias and Marsh Islands two rocks, which should also be left to port, passing halfway between them and Edward Peninsula. Continue the course between Macias and Brecknock Islands, heading for

Cape Atracadero, of Brecknock Island, situated north of the west extreme of Macias Island. This will lead through Brecknock Pass, locally known as Belgrano, passing Capt Atracadero 100 to 150 yards on the starboard hand. Once in the passage, the other end of Brecknock Island will appear opposite Basket Cove, of the island of the same name; then, standing parallel to the coast of Brecknock Island, on a line between Cadiz Point and Cape Atracadero, leave the Merry Islets and Bevan Shoal on the port hand. The latter is marked by kelp, but this is difficult to make out on account of the currents. Soundings of 2½ fathoms have been taken over this shoal at low water, which is situated halfway between Merry Islet and Cape Atracadero.

From this point proceed in midchannel, heading for the slope of Georgiana Island.

In Edward Peninsula are Ports Edward, Langlois, and Chico. Between Macias and Basket Islands are several rocks and breakers, and after passing the last island Cadiz Rock will be seen, which lies well out of the course. After passing Brecknock Island a deep entrance with various islets will appear, and from opposite Georgiana Island a low point extends into the channel from the end of a long peninsula and it would be well during thick weather to stand a little toward the shore of Georgiana Island, but not until after passing Cadiz Rock.

Reaching the north end of Georgiana Island, Vuelta Point, long and sloping, will appear at the northwest end, and Mount San Paulo will appear in the distance through a channel north of the point. Vuelta Point is clear and may be rounded at a prudent distance.

Upon opening the channel head for Horacio Peak, London Island, which course will lead clear of the dangers on both sides, leaving Nelson Islets on the starboard hand and observing caution in their vicinity, as rocks marked by kelp extend from them. In case thick weather is met at Vuelta Point, set the course by compass, proceeding with great caution until sighting the Nelson Islets. It often occurs that before reaching the above islets there will be seen near the east coast of Nelson Island a small islet under Mount Horacio; this islet in line with the peak will lead clear of all dangers.

When approaching Nelson Islets, Capea Islets will appear on the port side, and Sidney Island, which with London Island forms Pratt Pass. There is also a passage between the Nelson Islets, but it is dangerous and may be used only by very small vessels.

Passing the Nelson Islets, the opening of the channel between London Island and Brecknock Peninsula will be seen to the northwest; stand down the middle of this channel, avoiding the coasts on either side, especially that of Aguirre Island. When passing

Mount San Paulo, Astrea Island will appear, separated from London Island by a little channel, and nearly opposite it on the other side of the channel is the entrance to Occasion Channel.

To reach Cockburn Channel a vesssel may pass either through Occasion Channel or continue through Brecknock Pass; the only difference between the two passages is that smooth water will be found in the former channel, except at the northwest outlet, while it is usually rough in the latter channel. Occasion Channel has the disadvantage for large vessels of the sharp turn at Giratorio Point, but it has been used on several occasions by large vessels.

There are several anchorages in London Island, the most important of which is Townshend Harbor, in Pratt Pass.

**Occasion Channel.**—A little before reaching the narrow passage between London and Astrea Islands, in case thick weather continues, look toward the starboard beam, and the entrance of Occasion Channel will soon appear, with various islands or rocks and Port Quo Vadis showing on its port side; on the starboard side of the entrance lies Pyramid Point, from which shoals marked by kelp extend for a short distance.

Soon after entering the channel an islet will appear at the head, which must be left on the starboard hand in turning Giratorio Point of Aguirre Island. It should be borne in mind that the change of direction of the channel is somewhat obscured, for which reason it would be advisable to keep a little to starboard of the middle of the channel and keep a sharp lookout for the opening.

Beyond Giratorio Point the Pajaros Islets will appear, two of which are surrounded by kelp; these lie in mid-channel and should be left to the southward, fairly close-to. These islets should not be confused with the one close to the shore of the island. Opposite the Pajaros Islets, to the north, is a large inlet, and from Brecknock Peninsula a point projects toward the second of the two islets; pass midway between the islet and the point, then head to port and stand along the coast of Aguirre Island, avoiding the banks off the north coast which extend well into the channel and are covered by kelp. Before reaching Luz Point, on the coast of Aguirre Island, head to the north for Cape Negro on the opposite shore to avoid the different shoals, leaving Peligroso Bank on the port hand. This bank, marked by kelp which is difficult to make out, is situated opposite Cape Negro, and it will be necessary to approach the latter, which appears to be clear. In case of thick weather, Cape Negro may be seen from the coast of Aguirre Island, and the bearing of it will indicate when to change course in order to pass clear of the dangers. Port Luz lies opposite the bank above mentioned in the coast of Aguirre Island.

Leaving Cape Negro, three islets bordered by kelp will be seen; the largest and nearest is Redonda Islet; pass between this island and the next one to the northwest, then stand on the line between Redonda Island and Rompientes Rock, leaving the latter on the starboard hand in passing out of the channel. This course will avoid the banks which extend from both shores of the channel, and in case Rompientes Rock is not seen, set the course for it, and when it is sighted pass midway between it and Negra Rock, which lies off Miguel Point of Aguirre Island.

Passing out of Occasion Channel head for the Magill Islands, and beyond them will appear the Enderby Islands, which are very characteristic in form and locally known as the "Paps of Calderon." At the opening of Cockburn Channel head to starboard, leaving all these islands to port. In case of fog it should be remembered not to change course to starboard until 3 miles within the entrance of the channel as the coast of Brecknock Peninsula is foul for a greater distance seaward than shown on the chart.

**Brecknock Pass.**—After passing Mount San Paulo, if it is desired to continue through Brecknock Pass, stand in mid-channel between Astrea and Aguirre Islands, and soon Tussac, Leon, and Las Furias Rocks will be seen on the port hand; Mount Skyring, in the Magill Group, and Fury and Henry Islands will be seen ahead. Continue the course until the entrance of Cockburn Channel is well open and the characteristic form of Enderby Island is seen. Leaving this pass during bad weather, care should be taken to avoid Charcot Rock, which shows at low water and is charted 3½ miles west of Miguel Point of Aguirre Island. Although the majority of navigators have never seen it break, its vicinity should nevertheless be avoided, passing on either side of it.

**Cockburn Channel.**—If the Enderby Islands or Henry Island, from the latter of which a low point extends into the channel, are not visible on account of the weather, making it necessary to stand into Cockburn Channel by compass, it is well to repeat that a good berth should be given to Aguirre Island, as the coast of Brecknock Peninsula is foul for a greater distance to seaward than the chart indicates.

Upon approaching the Enderby Islands they should be left on the port hand and the course set to pass either north or south of Kirke Rocks. The former is preferable in thick weather, for, although both passes are deep, the southern pass leads near the coast of Brecknock Peninsula, which presents a series of entrances and points which have been but imperfectly examined and should be approached with caution; to the north of Kirke Rocks the channel is more open. When within 1 mile of Kirke Rocks they will appear as a long low island of irregular profile.

Northeastward of Enderby Islands, between them and the Duntze Islands, is the opening of Adelaide Passage, which leads to Barbara Channel. There are various anchorages in the Magill Group, and the coast of the Brecknock Peninsula has many openings, of which Chasco and Brujo Sounds, in which is situated Port Alegria, are the best known.

Passing north of Kirke Rocks, when they are on the beam bring Enderby Islands astern and head for Barrow Head. On the port hand will be seen Eliza Bay and the Banes Islands in the mouth of Dyneley Sound; on the starboard hand, the points and entrances of Brecknock Peninsula, and, farther off, the Prowse Islands, in which is Bluff Sound, with Ports Tanteo and Saco. When within 1 mile of Barrow Head, Fitz Roy and King Islands will be seen a little on the starboard bow to the left of Prowse Islands; Fitz Roy Island is the smaller and appears to the left of King Island. Port Barrow (Vallarino) lies around the nearest point of Barrow Head, to the left of a low sloping point which forms the southern end of the head.

Passing between Barrow Head and Prowse Islands, head to pass close to the north or south of Fitz Roy and King Islands, which, at a distance of 2 miles from the first named, should appear overlapping to about one-half the length of the former; from this position the passages on either side will be seen. The passage south of the islands is the narrower and tide-rips are formed here by the currents, rendering steering somewhat difficult, for which reason the northern passage is recommended, especially for a large vessel.

After passing Fitz Roy Islet stand parallel to a line between it and the north side of King Island, giving heed to the rock charted between Fitz Roy Islet and Park Bay and leaving it to port; this rock is visible and lies more than 1 mile northeast of Fitz Roy Islet. The shores of Fitz Roy and King Islands are clear and may be approached to a prudent distance. Continue this course as far as Cape Turn, the low point of which is characteristic. Behind the low point a snow-capped mountain appears, and to the south of the point is the peak of Pyramid Hill.

**Anchorages.**—On the north shore of Cockburn Channel, at the southwest part of Barrow Head, is Port Barrow (Villarino), in which may be seen a waterfall, and with a beacon on the low point on the port hand. Port Soffia, in the southeast part of Barrow Head, is separated from Park Bay by the entrance of Mecury Sound. After passing King Island the opening of Stormy Bay will be seen, the little peninsula which divides it into two arms appearing as an island. Warp Bay is situated at Cape Turn. The south coast of the channel has been but imperfectly examined; Port Ideal lies opposite Stormy Bay and has an islet in its entrance.

**Magdalena Channel.**—At Cape Turn is the end of Cockburn Channel and the beginning of Magdalena Channel which trends toward the north. Looking from Cape Turn toward the southeast, three large glaciers will be seen descending from Mount Sarmiento; the mountain is not often visible. Steer to pass 1 mile to starboard of 100-Fathom Island, so called on account of a sounding shown near it on the chart.

When 4 miles from the above-named islet it will appear against the land about halfway between Mount Hurt and Anxious Point, and at a distance of 2 miles the opening of Keats Sound will be seen to the starboard.

Labyrinth Islands and Transition and Drew Bays will be left to the westward; to the east, opposite 100-Fathom Island, is the opening of Keats Sound, which is wide and deep, but imperfectly examined, with a shoal marked by kelp at ½ mile northwest of the south point of its entrance.

After passing 100-Fathom Island, stand in midchannel, and Sholl Bay will soon appear on the port hand. The entrance to this bay should be made from the north, passing near the shore of Mount Boqueron and leaving to port the north shoal, between it and Entrance Islets, or between the south shoal and the coast. Coming from the south it would seem convenient to approach the port between the north shoal and Entrance Island, but this pass is not recommended on account of shoals.

Passing Sholl Bay the outlet of the channel will open between Mount Vernal and Anxious Point; on the starboard side, in the bay at the foot of Mount Hurt, two islets will be seen, the first smaller than the second. On the port hand, Stokes Inlet will open around Squally Point, with the Rees Islets in the center, and beyond this inlet is Port Hope, the entrance of which is marked by a large, vertical, bare streak on the hill.

**Magellan Strait.**—Leaving Magdalena Channel, passing halfway between Anxious Islet and Mount Vernal, set course to leave Kelp Patch on the starboard side. This is a patch of 3¼ fathoms situated about 3½ miles southwestward of Hillock Point, Dawson Island. Upon entering Magdalena Sound, Periagua Islet and Peak Island will be seen on the port side, and the entrance to Gabriel Channel on the starboard quarter.

After passing Kelp Patch, set course for Cape San Isidro. Bearings of this Cape and of Cape Froward should be taken to fix the position, as the prominent points on the eastern shore are not charted in exact positions and the bearings do not agree.

Cape San Isidro may be passed at less than ½ mile distant, as the rock which lies near it is covered with kelp and is situated 400 yards from the cape. From this point follow the route indicated on the

chart, on which course the currents are not strong. It should be borne in mind that points Santa Anna, Carreras, and Guayrabo are low with reefs extending from them a short distance, and should be avoided during thick weather.

Between Cape San Isidro and Punta Arenas are several anchorages, which may be used in case of necessity, bearing in mind that the prevailing winds come from between southwest and northwest.

### TIERRA DEL FUEGO.

**Tierra del Fuego,** the largest island of the archipelago which clusters round the southern and western shores of Patagonia, is about 150 miles from north to south and 250 miles at its broadest part from east to west. In its southern part Mount Sarmiento and the Darwin Range rise to heights of 6,000 feet above the sea level and are clothed in perpetual snow; the remainder of the island is more of a generally undulating character, with large plains and ranges of hills; the interior is unmapped, but has recently been partly explored by gold prospectors, who have had moderate success.

### NORTHEAST COAST.

From Cape Espiritu Santo whitish cliffs extend with but few breaks, about 23 miles to Nombre Head. The land is several hundred feet high and quite destitute of wood, and, except being more green in appearance, resembles the coast of Patagonia. Between Nombre Head and a range of higher and more hilly land which ends south of Cape San Sebastian the land is so low that it can not be seen from a vessel's deck until within the horizon.

In 1889 the British vessel *Champion* visited this coast. Between San Sebastian and Good Success Bays natives were seen at most parts of the coast. Some Europeans engaged in gold mining were seen at Nombre Head, about 10 miles northward of San Sebastian Bay, where there were several buildings and a flagstaff flying the Argentine flag. Also near Cape Medio some Europeans were found searching for gold.

The coast is visited every three months by an Argentine Government vessel.

The Yahgan Indians of these parts may be trusted to guide those in distress to the refuge stations.

**San Sebastian Bay.**—A long ridge of shingle extends 9 miles southward from Nombre Head, ending in a sharp point, Arenas, which may be closely approached. The bight inclosed between this point and Cape San Sebastian is the large bay of the same name, affording good anchorage from all but easterly winds, which seldom blow with any strength. Within the point, which is steep-to,

the bottom is uniform, with depths decreasing gradually. There is no hidden danger on the north side of the bay. On the south side, off Cape San Sebastian, it is otherwise; a rocky ledge extends under water to the northeastward, and the cape requires a berth of 4 miles in rounding. There is no kelp upon the ledge, which upon the west side shoals suddenly from 12 to 4 fathoms; the ebb tide sets over it about 2 knots an hour. The bay is easy of access, and with good holding ground; there is no wood, but water may be procured from an indifferent watering place.

**Cape San Sebastian** is a bald, cliffy, headland of a dark color. Inshore of it the land rises to nearly 1,000 feet above the sea. At 5 miles southeastward of the cape is another small cliff, about 1 mile seaward of which is a rock above water; between the latter cliff and the cape the land is low. Hence to Cape Sunday the shore is rather low, irregular, hilly, and fronted by a shingle beach, but hilly at the back.

A patch of kelp is reported to exist 13 miles 76° from Cape San Sebastian.

**Cape Sunday,** 22 miles from Cape San Sebastian, is a prominent headland, of a reddish color, rising 250 feet above the sea; the coast in its vicinity is free from danger. The Rio Grande, 11 miles south of Cape Sunday, divides the pampas region from the wooded region in the south. The river is not navigable, and has numerous rocks, some of which dry at low water, near its mouth.

**Cape Peñas,** at 17 miles southeast of Cape Sunday, is about 100 feet high, with dangerous rocks, on which the sea nearly always breaks, extending 2 miles seaward from it; these rocks should be carefully avoided, especially at night. The bay formed to the southward of the cape appears to afford anchorage, but the appearance is deceitful, as it is shallow and strewed with rocks. The hills hereabout are high and partially wooded, and the view of the country is pleasing.

**Tides.**—High water, full and change, at Cape Peñas is at 6h. 0m.; springs rise 12 feet.

**Cape Santa Inez,** 22 miles southeast of Cape Peñas, Cape Medio, 11 miles southeast of Santa Inez, and San Paulo, 8 miles farther east, are high, bold, and fronted by steep cliffs, 200 or 300 feet high. Hence to Cape San Diego the water is not so deep as to prevent a vessel anchoring during westerly or southerly winds.

**Champion Rock** is about 1 mile from the nearest shore and 1½ miles from Cape Medio, which bears 122°. There is a depth of about 8 feet on the rock at low water, with 6 fathoms close to seaward.

**Orosko Table,** 4 miles inland, is a remarkable table-topped mountain 1,000 feet high. To the eastward of it are three mountains, the

Three Brothers, the western one being similar in appearance to Orosko. They form an excellent landfall for vessels bound through the Strait of Le Maire or around Staten Island.

**Policarpo Cove,** situated 42 miles southeast of Cape San Paulo, is deceptive in appearance, as it looks like a harbor, but is fit only for a boat. False Cove, 6 miles farther east, will hardly give a boat shelter. Cape San Vincente, 8 miles east of False Cove, is a dark, low, bluff point, backed by wooded hills, 200 or 300 feet in height. Rocks and foul ground extend ½ mile from the cape.

**Thetis Bay** is an anchorage which may be taken by a vessel intending to go through Le Maire Strait, but detained by wind or tide. The tidal currents set strongly across the bay in line with the heads. There is much kelp in the bay, but so far as known no dangers have been discovered among it. With the wind and tidal currents opposite each other, a great sea rolls into the bay. In leaving it to round Cape San Diego a good offing must be obtained in order to clear the heavy tide races off that cape.

**Cape San Diego,** low and ending in a small bluff, has off its eastern point a rocky ledge more dangerous than has been supposed. The tide races are so violent here that soundings can not be taken so frequently and accurately as desirable. In the middle of the race depths have been found to vary from 60 to 70 fathoms, to 9 and 5 fathoms; it will, therefore, be prudent to give the cape a berth of at least 5 miles. A vessel was seen to founder in this race, but whether from striking on a rock or from being swamped was not known. The bark *Hermine*, in passing through the strait, struck three or four times, with the northeast extreme of the cape bearing 322°, distant, by estimation, 1¾ miles, or nearly in the position marked 5 fathoms on the chart. The vessel was drawing 16 feet, which may be accepted for the present as the depth of the shoal.

The shoal is steep-to, no soundings at 10 fathoms being obtained directly before and after the vessel struck.

When subsequently in the race, at 1½ hours' flood, spring tides, the vessel sustained severe damage from the heavy seas that came on board.

### LE MAIRE STRAIT.

The soundings in Le Maire Strait are reported to be regular near the southern entrance, 70 to 30 fathoms, sand; toward the north the depths decrease, and 2 miles from Cape San Diego the bottom is very irregular, as previously mentioned. The eastern side of the strait is bounded by the irregular bays and rugged capes of Staten Island. As the strait is wide and free from obstacles, with the exception of the rocky patches extending from Cape San Diego and the irregular soundings there, which produce the race already de-

scribed, vessels may pass through with caution. The tidal currents are regular and will assist a vessel materially in her passage if taken at the right time.

It is recommended that vessels from the northward should not attempt the passage of the strait until one hour after high water. Mr. Gray, master of the British bark *Shun Lee*, states that it is his practice on arriving near the strait to wait 5 or 6 miles to the northward until a little after high water. Also, that in March, 1881, he entered the strait at that time of tide, and although it was blowing a gale from the southwest, the ship drove through rapidly.

After rounding Cape San Diego, giving it a berth of at least 5 miles, keep over toward the Tierra del Fuego shore, for in case the wind or tide should change or fail, Good Success, Valentyn, and Aguirre Bays are near at hand, where anchorages may be had. The two latter, being much exposed to the south, are not fit for more than temporary berths during northern or westerly winds.

Avoid closing in on the Staten Island side of the strait on account of the heavy tide races and the almost absolute impossibility of finding anchorages there; also, on account of the reef said to exist 3 miles off the coast in the rip just north of Cape South.

**Good Success Bay** is a small inlet where there is a good anchorage for vessels. The best berth is in 10 fathoms. Do not anchor too far in toward the sandy beach at the head of the bay, for during southeast gales dangerous rollers set into the bight; with strong winds it is subject to squalls, which, during westerly gales, are very violent. North and South Heads are heights of about 1,200 feet. This is an excellent place for vessels of any draft to put into for fresh water or wood. In the winter season, when easterly winds are common, anchor nearer the mouth of the bay than during the summer season.

The settlements at Good Success Bay and Thetis Bay have been abandoned, and no stores for shipwrecked mariners are left at these places.

About 6 miles 214° from South Head of Good Success Bay is a rock appearing like a ship under sail.

**Tides and tidal streams.**—High water, full and change, in Good Success Bay is at 4h. 3m.; springs rise 6 to 8 feet. It is slack water in Le Maire Strait at or near the time of high and low water in Good Success Bay. In Le Maire Strait the flood stream makes to the northward about one hour after low water, and the ebb to the southward about the same time after high water, and the strength of the stream is from 2 to 4 knots near Cape San Diego and from 1 to 3 knots in midchannel, more or less, according to the wind. The streams in the strait are regular, and assist a vessel materially in her passage if taken at the right time.

## STATEN ISLAND.

**Staten Island** lies off the southeasterly extremity of Tierra del Fuego, and is so deeply indented with bays, like all the islands in this part of the world, that it forms four nearly distinct islands. It is 38 miles long and separated by Le Maire Strait from the mainland. The island is mountainous, and its peaked summits, rising to a height of 3,000 feet, are covered with snow throughout most of the year. It offers a good landfall for vessels bound to and from the Pacific. The harbors are the continuation of the valleys, and are surrounded by high land, with the water in them deepening toward the center. The coast consists everywhere of rocky cliffs, varying in height from 200 to 500 feet.

The best harbors are on the north side of the island. All the anchorages, though well protected when once gained, are difficult of access from the force of the tidal currents setting across the mouths of the inlets, the great depth of water, and variableness of the wind, which finds its way down the ravines of the mountains in various directions.

With a boisterous and humid climate and a low, but very uniform, temperature, vegetation flourishes with such surprising beauty and luxuriance that the rugged aspect which the island seems to wear at a distance is changed into perpetual and unbroken verdure. The antarctic beech is the common tree.

**Flinders, Crossley, and Franklin Bays.**—The west coast of Staten Island forms the eastern side of Le Maire Strait; it is high, rugged, and deeply indented by Flinders, Crossley, and Franklin Bays. Flinders Bay, between Cape St. Anthony, the northwestern extreme of Staten Island, and Cape Beaulieu, at 5 miles southward of it, is about 3 miles deep. Anchorage may be found in the small coves on the eastern side of this bay, and also in Crossley Bay, which lies about midway between Cape Beaulieu and Middle Cape at 2½ miles southwest of it; these bays are, however, open to the prevailing winds, unprotected from the sea, and can by no means be recommended. There is a good landing place in a small cove about midway between Middle Cape and Cape South at 3 miles south of it.

**Caution.**—Heavy tide rips are found off Capes St. Anthony, Middle, South, and St. Bartholomew, which form the high projecting horns of the above-named bays; they extend 5 or 6 miles to seaward, and the north-going stream has a velocity of from 5 to 7 knots. A reef is said to exist in the rip just north of Cape South, distant 3 miles from the coast.

**Rock.**—A rock, nearly awash at low water, is reported to lie about 4 miles to the southward of Cape St. Bartholomew, with that cape in line with Cape South, in approximately latitude 54° 58′ S., longitude 64° 47′ W.

**Black Mary Harbor.**—From Cape St. Bartholomew, the southwestern extreme of Staten Island, the southern shore trends in an east-northeast direction about 15 miles to York Bay, in the northwest corner of which lies Black Mary Harbor, where there is stated to be depths of 5 to 13 fathoms, but little is known about it.

**Port Vancouver.**—From Cape Webster, the eastern entrance point of York Bay, the shore trends in a northeasterly direction 7 miles to Port Vancouver, which is the only well-sheltered harbor on the south side of Staten Island. In the western arm of this bay is a secure anchorage in 11 to 16 fathoms, sandy bottom, close to a small fresh-water stream and near a convenient wooding place. All dangers (a rocky islet on the east side of the entrance and a small reef off the south point) may be avoided by not hauling in for the anchorage until a remarkable white ravine on the south shore becomes visible. A vessel must moor with open hawse to the westward. The port may be easily recognized from seaward by the Dampier Islands, on the east side of Cape Webster.

**Back Harbor,** 7 miles east of Port Vancouver, has good holding ground and affords secure shelter from northwest winds, but it is open to the heavy rolling seas due to the southwest winds, and as wood is scarce and water difficult to obtain (in consequence of that surf), this harbor is not recommended.

**St. John Harbor,** the easternmost in the island, extends 3 miles in a southwesterly direction, with an average width of ¾ mile, and may be easily recognized from a distance by Mount Richardson, at the base of which it is situated. On nearing the entrance a remarkable cliff, like a painter's muller, appears on the eastern shore, which is high and steep, the ridge over it being 850 feet above the sea. Allowance must be made in steering toward the harbor for the set of the stream, which at all times runs rapidly across the mouth; it is, however, less sensible when within the line joining Cape Furneaux and Cape St. John, inside which, in case of necessity, or to await the turn of the tide, an anchor may be dropped in 20 to 30 fathoms. The mouth of the harbor is about ½ mile wide, having 25 fathoms in the center. The west point must be given a good berth, as there is a rock standing off it at some distance. The shores with this exception are bold, and immediately within the west point is a small bay where anchorage may be obtained in 10 fathoms.

The most sheltered place is at the head of the bay, where a berth may be taken up in 20 fathoms, sandy bottom, and moor with an open hawse to the southwest, from which direction the gusts of wind are violent. There is a beach of sand at the head of the bay, where a vessel might be hove down for repairs.

The shores of the bay are lined with kelp, its edge being almost invariably in 8 fathoms and generally near the shore, which is an excellent indication of the unsafe parts.

**Supplies.**—Wood and water are plentiful and easily procured; celery and wild fowl may be obtained, and in the proper season (October) a good supply of penguin's eggs may be had.

**Refuge station.**—A station has been established by the Argentine Government in this harbor, provided with a lifeboat for the assistance of shipwrecked mariners.

**Port Cook,** 8½ miles west of St. John Harbor, extends in a southerly direction 2½ miles, with an average width of nearly ½ mile, and from the good anchorage at its entrance, the greater steadiness of the prevailing winds, and the facility of communication with the south side of the island by means of the low isthmus separating it from Port Vancouver, is the most eligible harbor in Staten Island for a vessel in want of shelter. The mouth, however, is not more than 400 yards across, with a depth of 6 fathoms, abreast a small island close to Wales Point, the eastern entrance point of the port, thence within the depths increase to 16 and 20 fathoms; the best anchorage is in 12 to 15 fathoms at the head of the harbor. Care is necessary when approaching to avoid a rock awash lying ¾ mile 28° from Wales Point.

**Port Basil Hall,** 5½ miles west of Port Cook, can not be recommended for a large vessel, but is considered a good port for small craft. The head of Port Basil Hall is separated by a narrow neck of elevated land from the head of New Year Harbor, though the mouth is 2½ miles west of the entrance of New Year Harbor. The former is a convenient anchorage, and well sheltered from all winds, though the depth of water and contraction of its mouth by two detached rocks render it difficult of entrance without a commanding breeze and favorable tide. There are three rocky patches nearly in the middle of the entrance, but all the danger is pointed out by the kelp and by the tops of the rocks, which show at half tide; they must be passed on their eastern side, where it is sufficiently wide to admit of working in moderate weather.

The best anchorage is in 7 to 10 fathoms, between a small green island on the western shore and a fine sandy beach north of it; this island may be passed on either side, taking care to avoid a rocky ledge that extends from its southeast extremity. Although the williwaws common to all the harbors of Staten Island also exists here, the comparative lowness of the southwestern shore renders them less violent than in many of the others; and the New Year Islands, though at a distance, afford some protection to the harbor from the sea.

There is anchorage also on the eastern side of the bay, just within the entrance, but it can not be compared with the other, being exposed to the swell that rolls in from seaward, and open to the influence of the prevailing westerly winds.

The best directions for entering this harbor after passing the rocks are to steer for a remarkable peaked hill, the eastern one of two hills near the head of the bay, until another peak on the western shore (which stands by itself) comes into view, after which the course may be shaped to pass the island on its northern side, where the best anchorage is found.

**Supplies.**—Wood and water are abundant, and fish of a large size are found among the kelp.

**New Year Islands,** lying off the north coast, afford protection from westerly winds. The anchorage is under the lee of the north island in 17 fathoms, but on account of the rapidity of the tidal currents, the uncertainty of the eddies, and rocky bottom it is so difficult to keep a vessel clear of her anchors that navigators are advised not to use this berth except in cases of necessity.

**Light.**—From an iron tower 71 feet high, painted in gray and black stripes, with black cupola, erected on the summit of the outer or northeastern New Year Island, is exhibited a flashing white light, 210 feet above the sea and visible 16 miles.

**Radio station.**—A radio station, call letters W A N, is located southward of the meteorological station on New Year Island.

**Port Parry** is the first opening to the westward after passing the New Year Islands. Mount Buckland, on the eastern side, has a quoin-shaped appearance, which renders it a prominent object. There are several small rocky islands off both points of entrance, but they are bold and steep-to and there is no danger in approaching them.

The inner harbor has an entrance but 150 feet in breadth, with an average depth of 8 fathoms water. After clearing this narrow gorge bring the eastern point of the outer entrance in line with the eastern point of the gorge, in order to clear two rocky patches that lie on either side within the gorge.

**Directions.**—If intending to anchor in the outer harbor the western shore must be kept aboard, but if standing in for the inner one hug the eastern shore until abreast of the white ravine. Do not attempt sailing through the gorge unless favored with a leading wind; with baffling winds the better way would be to furl all sail and tow or warp through. There is good anchorage in 9 fathoms, sandy bottom, southward of a small grassy island on the eastern shore of the inner harbor, after which the water deepens to the head of the bay. Here a vessel may moor with an open hawse to the south-southwest opposite a sandy beach.

There is a rocky patch with 4 fathoms on it nearly in the center of the outer port. The depth of water in the western arm is an objection to it as a place of long continuance for a vessel, but the bottom is good, and both wood and water may be procured, though the swell that rolls in on the rocks would be very destructive to the boats on landing. There is, however, a convenient place for the employment of a hose when watering. The hawse should be open to the westward in the event of mooring.

This is a favorite resort for the sealing vessels when in want of repairs or as a place of shelter while their boats are absent.

**Supplies.**—Wood and water may be got on board with facility opposite the anchorage at the head of the inner harbor, and good clams are found in the sand at low water.

**Port Hoppner** is the last harbor to the westward. Like the preceding, it is divided into two harbors; in the mouth of the outer one there is a high rocky island which is a protection against the northwest winds. On the lee side of this island anchorage may be had for the space of ½ mile in from 20 to 8 fathoms. To the southeast of the island, however, there is a continuation of rocky patches, two pinnacled rocks of which show above water and are surrounded by kelp.

Near the head of the outer harbor there is also anchorage close to the shore, which on the western side is high and precipitous. The gorge is not more than 25 to 30 yards wide, with depths of 2 to 4 fathoms in it, yet the sealers sometimes haul their small schooners through into the inner basin, where they are moored by hawsers to the rocks, secure from all winds and in depths of 20 to 6 fathoms. The tidal stream rushes through the narrow opening with great velocity; it would be prudent, therefore, not to commence warping in until the last quarter flood.

A stream flows into the head of the inner basin from the mountains by which the whole harbor is surrounded. In the outer harbor there are no soundings in the middle at 40 fathoms, and it is by no means so convenient or secure as either of those previously mentioned. Wood and water are tolerably plentiful.

**Tides.**—High water, full and change, in Port Vancouver is at 4h. 30m., and is very nearly the same in all parts of the island; springs rise 8 feet.

The tidal streams are rapid, and as they meet with obstacles from the manner in which the headlands jut out at right angles to their direction, the natural consequence is, especially when the wind is strong and contrary, a rough cross-breaking sea which is impassable by boats, and even dangerous to a vessel of considerable size.

There is also reason to believe that the meeting of the current coming round Cape Horn with that through the various channels of

Tierra del Fuego contributes to the unusual agitation of the sea in the vicinity of Staten Island. The flood stream flows to the westward along both shores of Staten Island. On the south shore there is a remarkable undertow, which renders it dangerous for boats to stretch across the mouth of the deep bays, as it is difficult to close again with the land, and for this reason the sealers invariably follow the circuitous route of the shore.

The west-going stream at Staten Island, meeting the current eastward round Cape Horn, is quite sufficient to account for the agitation exhibited by the sea in the neighborhood of Staten Island, even in moderate weather, without taking into account the prevalence of the violent westerly gales.

When bound eastward of Staten Island the state of the tide must be considered, as the flood stream sets strongly from the southeastward toward the island.

**Caution.**—With the east-going stream there are dangerous overfalls off the east point of Staten Island, especially with easterly winds; vessels should keep at least 10 miles east of the island when easterly winds prevail.

### SOUTH COAST—CAPE GOOD SUCCESS TO BREAKNOCK PENINSULA.

**The coast** from Good Success Bay trends in a southerly direction 8 miles to Cape Good Success, thence in a westerly direction 43 miles to Cape San Pio. Cape Good Success is high and bluff, with rocks above water close to, while at 2 miles northeast of the cape and close to the shore there is a rocky islet which appears as a ship under sail.

On the west side of Cape Good Success there is an opening named Valentyn Bay, and at 10 miles farther west lies Aguirre Bay, the western arm of which is named Spaniard Bay.

Sloggett Bay, 20 miles west of Aguirre Bay, has in the middle an islet, at 1 mile 157° from which there is a rock marked by kelp. During southeast gales the sea breaks on this rock.

None of these bays are fit for more than temporary anchorage during northerly or westerly winds.

Coal, said to be of good quality, is found at Sloggett Bay.

**Bell Mountain,** 2,600 feet high, between Valentyn and Aguirre Bays, resembles a large bell, and may be seen in clear weather from a long distance seaward. It is very useful as a sea mark and is often the last remarkable object visible before the weather thickens up for a storm.

**Picton Island** lies in the mouth of Beagle Channel and north of Lennox Island. A very thick patch of kelp extends for 3 miles off Cape Maria, the southeast point of this island. Depths of from 7 to 12 fathoms have been obtained about 2 miles offshore in this kelp.

Garden Island, a small island, is on the north shore of Picton, and just southeast of it is Banner Cove, snug and well sheltered, where good anchorage will be found in about 13 fathoms.

The passage between Garden and Picton Islands is fit for boats only.

**Beacon.**—A white wooden pyramid, marked "6" and surmounted by a staff, stands in the northeast point of Garden Island.

**Puerto Toro** is a Chilean settlement on the east coast of Navarin Island, just north of Cape Rees, in latitude 55° 05′ south, longitude 67° 06′ west. The entrance is about ½ mile wide and the port is protected from winds.

**Moat Channel,** the passage north of Picton Island, is about 4 miles wide. The Becasses Islands lie in mid-channel in its western end; detached patches lie southward and eastward of these islands.

**Beacon.**—A white wooden pyramid, marked "5" on its western side and surmounted by a staff, stands on the center of the western Becasses Islands. (*Disappeared in 1913.*)

**Beagle Channel** is a narrow passage running west between ranges of snow-capped mountains. It averages 1½ miles in width, and in general has deep water, but there are many small islands, with rocks off them, scattered throughout the entire length. Although easy of access it is quite useless for a sailing vessel to attempt its passage, but steamers may profit by its straight course and smooth water. The first opening, Murray Narrows, leads to the southward into Ponsonby Sound. Twenty-seven miles beyond this opening the channel divides, the southern arm falling into Cook Bay and the other into Darwin Sound and thence through Whaleboat Sound and Desolate Bay to the Pacific.

The tidal currents average about 1 knot an hour throughout the whole length of the channel, the flood to the eastward and ebb to the westward.

**Anchorages.**—The eastern part of Beagle Channel, as far as Gable Island, has moderate depths, with good holding ground, and vessels may anchor in case of need. Between Yunque (the Anvil) and Martillo Islands is an anchorage in about 8 fathoms, mud, midway between the islands. The eastern end of Martillo Island is a white cliff. This anchorage appears to be a good one, and has not the inconvenience of the strong current which is met with at Packewaia Bay, south of Gable Island.

**Shoal.**—About 1 mile eastward of the south end of Yunque Island is a shoal having a least depth of 22 feet water.

**Harberton Harbor,** 11 miles west of Picton Island on the north shore of Beagle Channel, runs northwest about ½ mile, and has anchorage in 8 fathoms, mud, near the middle of the harbor, 300

yards within the entrance. A settlement and a large sheep station are located here.

**A shoal,** marked by kelp, with a least depth of 4 fathoms over it, lies in the approach to the harbor, 1,600 yards 178° from the point on the western side of the entrance.

**Beacon.**—A white tripod, with central staff carrying a square board, the upper part of which is painted red and the lower part white, stands on the west entrance point of the harbor.

**Gable Island,** 3 miles west of Harberton Harbor, has a shoal with 15 feet, bottom black mud, extending 700 yards from its southwest side. A red buoy, moored in 18 feet of water, marks the edge of the shoal. Piedrabuena Point, on the south shore of Mackinlay Pass, is marked by a small white post. (*Disappeared, 1912.*)

**Beacon.**—A square pyramidal concrete beacon, 10 feet high, surmounted by a cross, stands on Gable Island at 20 feet above water.

**Herradura Bank.**—A black can buoy marks the northern edge of this bank, but as the buoy has often been out of position it should not be depended upon.

**Almirante Brown Bay.**—Vessels may anchor either outside or inside of the bar, on which there is a depth of about 15 feet separating the outer anchorage from the inner.

**Beacons** are located here as follows:

On the summit of Upu Island, east side of the bay, a beacon consisting of two barrels, one above the other, surmounted by a staff.

On the shore at the head of the bay, two beacons, which when in line, bearing 37°, lead over the bar. The front beacon consists of a post with stays at its lower part; the rear one is white, 32 feet high.

**Tides.**—It is high water, full and change, at Almirante Brown Bay at 3h. 35m.; tides rise about 7 feet.

**Port Almanza.**—Eastward of Almanza Point is the settlement of Port Almanza, off which there is anchorage in 9 fathoms.

**Beacons.**—On the shore of Port Almanza there are two beacons, each consisting of a skeleton wooden tripod surmounted by a staff with a double crosspiece.

These beacons, when in line, bearing 55°, lead ½ mile to the westward of Herradura Bank.

**Foul ground.**—Southward of Remolino Point lie the Lawrence Reefs, rocks marked by kelp; 9 de Julio Shoal, 30 to 50 feet long, with a depth of 36 feet, lies 1½ miles 129° from the point; and some rocks, about awash at low tide, lie 1⅞ miles 140° from the point.

**Settlement.**—Mr. Martin Lawrence, formerly resident missionary at Ushuwaia, is located at Puerto Remolino, near Remolino Point.

**Ushuwaia Bay,** on the north shore of Beagle Channel, 34 miles west of Harberton Harbor and north-northeast from Murray Nar-

rows or northern entrance to Ponsonby Sound, may be used as a place of refuge and relief to mariners shipwrecked in the vicinity of Cape Horn.

Ushuwaia is the headquarters of the Government of the Argentine portion of Tierra del Fuego; it is also a penal settlement.

**Buoys.**—A red buoy is located 550 yards from the head of the Government mole and in the line of its prolongation.

The 2-fathom shoal, situated a little less than ¾ mile, 36° from Oriental Point, is marked by a float on which is erected a tripod beacon, 6½ feet high, painted in red and white bands, and surmounted by a slatted pentagonal topmark.

**Radio station.**—A radio station, call letters W U H, is located at Ushuwaia Bay.

**Anchorage** may be obtained in 6 to 8 fathoms, sand and mud, at the head of the bay.

**Tides.**—High water, full and change, in Ushuwaia Bay is at 3h. 58m.; springs rise about 7 feet.

**Beacons.**—One mile eastward of Escarpada Point, on the northern shore of the bay, there stands a white triangular beacon marked "1," surmounted by a staff.

A post, with stays at its lower end, stands on Observatory Point.

On the western extremity of the largest of the Bridges Islands, in the group of islands and rocks to southeastward of Ushuwaia Peninsula, is a beacon formed of an upright, with crosspieces near the top.

A similar beacon to the above stands on the west side of the western of the Warden Islands.

**Lapataia Bay,** 7¾ miles west of Ushuwaia, is 2 miles long and ½ mile wide. Round Islet, 345 feet high, stands in the entrance and has a small pyramid on the summit. The anchorage is in 15 fathoms, sand and mud, about 1 mile westward of the south entrance point of the bay.

**Boundary Beacon.**—A red pyramidal beacon, 16 feet high, surmounted by a ball, stands on the high land between Lapataia and Yendegaia Bays. It indicates the boundary between the Argentine and Chilean Republics, but may also be useful as a landmark.

**Awaiakirrh Cove,** on the south shore of Beagle Channel, at 18 miles west of Lapataia Bay, and 4½ miles southeast by east from Divide Point, the east extreme of Gordon Island, is ¼ mile in extent and affords anchorage in 11 fathoms, mud, in the center of the cove.

**Fleuriais Bay,** on the north shore of the southwest arm of Beagle Channel, 11 miles west of Divide Point, affords anchorage in 12 fathoms, stone, with the east extreme of Senecal Islets bearing southwest, distant 1,100 yards.

**Romanche Bay,** on the north shore of Gordon Island, in Northwest Arm, at 12 miles west of Divide Point, runs in a southerly direction for 2¾ miles, thence westerly 1 mile, with generally deep water. At 2½ miles from the entrance there is anchorage in 15 fathoms, sand and mud, with a peaked hill 2,950 feet high, bearing 300°, nearly 1 mile distant. Immediately within the west entrance point of Romanche Bay is Morning Cove, having anchorage in 11 fathoms.

**Voilier Cove,** 5 miles westward of Romanche Bay, is about ½ mile in extent, with depths of 7 to 11 fathoms. Anchorage may be obtained in 10 fathoms, sand and mud, with the entrance points of the cove bearing, respectively, 309° and 58°. At 400 yards northward of the entrance to the lagoon, at the head of the cove, is a kelp patch, about equal distances from the shore around and 500 yards south-southeast of the above-mentioned anchoring ground.

**Timbales Islands.**—Three miles eastward of O'Brien Island lie the Timbales Islands, which consist of two small islands and a number of islets.

**Wreck.**—The wreck of the Argentine transport *Ushuwaia* lies stranded close eastward of the 10-foot patch on Condor Shoal, Timbales Pass, and constitutes a good landmark.

**O'Brien Island.**—Pomar Channel, north of the island, has several islets in its western entrance which render the navigation somewhat difficult; the channel south of the island is wider and clearer and is the one recommended. There is a clear passage between the eastern end of the island and the Timbales Islands.

Port Ballena, on the north side of O'Brien Island, has anchorage in its southwest corner, in 7½ fathoms, broken shell.

**Whaleboat Sound** leads westward from O'Brien Island into Desolate Bay; the route recommended passes southward of Grande Island, thence between Burnt and Bruce Islands.

**Beacons.**—The north and south points of the western entrance to Pomar Channel are each marked by a beacon, a post carrying a square white board.

A white post stands on an islet situated on the east coast of Grande Island.

A pyramid of barrels filled with concrete stands on an islet on the southwest coast of Grande Island; it forms a useful land mark for vessels passing through the sound.

In Rosa Bay, situated to the northward of the narrowest part of the isthmus of Londondery Island, there is a pyramidal beacon surmounted by a staff carrying two cylinders, vertically, one above the other.

A large prominent rock, located on the shore of Port Engano, 350 yards, 239° from the anchor shown on H. O. Chart No. 2392 as

indicating the anchorage ground, has been painted white and serves as a good mark for the same.

Deep-draft vessels can anchor on the bearings: Painted Rock, 268°; northern entrance point, 343°.

**Jiminez Shoal,** with 4¼ fathoms water, lies about 3 miles west-southwest from the western end of O'Brien Island; northward of this shoal, at about 1½ miles distant, is another shoal nearly in mid-channel.

**Burnt Island Anchorage,** Whaleboat Sound, is sheltered from prevailing winds, and anchorage may be obtained in 11 fathoms, good holding ground, off the northeast point of Burnt Island. There is a patch of kelp close to the anchorage, in which a least depth of 5½ fathoms was found. Kelp extends ¼ mile in an easterly direction from the southeast point of Burnt Island.

**Desolate Bay** has passages leading into Courtenay, Ladrones, and Whaleboat Sounds. Rocks, breakers, and islets abound, making these waters unsafe for vessels. Cape Desolation, the south point of Basket Island, is a prominent rugged headland with many peaks.

The route recommended through Desolate Bay, as indicated by the beacons, named below, leads between Burnt and Bruce Islands, thence north of Direction Island, and into the Breaknock Pass between Entrada and Gorda Islands.

**Shoal.**—A rocky shoal, 200 yards long and 100 yards wide, lies between Direction and Marchant Islands.

**Beacons.**—A post carrying two white square boards, one above the other, stands on the west extreme of Burnt Island.

A black cylindrical beacon is located on Direction Island, which is situated 3 miles westward of the beacon on Burnt Island. (*Carried away, 1913.*)

**Entrada Island** lies off the north point of Marsh Island, and is distinguished by a pyramidal beacon having one black and two red bands.

**Shoals.**—A 15-foot shoal lies just southward of mid-channel off the northwest point of Macias Island, and is known as Bevan Shoal. It is of small extent and clearly visible when over it; it is marked by kelp at half tide only.

Off the southwest point of Breaknock Peninsula are many islets and rocks, and much kelp exists in this vicinity toward the middle of the channel.

**Buoy.**—A cylindrical black buoy in (approximately) latitude 54° 41′ 40″ south, longitude 71° 35′ 20″ west, marks Bevan Shoal.

Occasion Channel is longer, more sinuous, and opens more to the eastward than is now shown on the chart.

**Beacons.**—On each side of the south entrance to Occasion Channel there is a pyramidal beacon.

A pyramidal beacon near the northern point of Aguirre Island marks the northern entrance to the channel.

### ISLANDS SOUTH OF TIERRA DEL FUEGO.

**New and Lennox Islands.**—New Island, 10 miles southward of Sloggett Bay, is 8 miles long, north and south, and 5 miles across. Lennox Island is 7 miles west of New Island. These islands may be approached with confidence, keeping a good lookout for kelp and using the lead. There are no known shoals and the water is not so deep as to the westward of Cape Horn; neither is the land so high. On the east side of Lennox Island there is a cove of the same name, where small vessels may find good shelter, but large vessels will have to anchor in Richmond Road, where there is protection from all but southeast winds. Soundings in the vicinity of New Island are quite regular and the shore steep-to. Good temporary anchorage will be found under the lee of this island during westerly winds.

Both islands are inhabited and gold is mined on Lennox Island.

**Goree Road,** between Lennox Island and Navarin Island, 3 miles west of it, is an excellent anchorage place for all vessels. There is no difficulty in either entering or leaving it, and good water and wood may be obtained with as little trouble as in any harbor on the coast. As far as known, the kelp in this harbor, as well as that found off Guanaco Point, does not grow upon rock, but upon loose, detached stones.

**Islet.**—In Goree Road, a little over 1 mile 112° from Middle Point, Lennox Island, is a small, rocky islet.

**Terhalten and Sesambre** are two small but high islands about 6 miles south of Lennox Island. They are 1 mile apart in a northwest and sautheast direction. Off the southeast side of Sesambre, the southern island, there is a reef marked by kelp.

**The Evout Islands** lie in the fairway to Nassau Bay, at 10 miles southeast of Sesambre.

**The Barnevelt Islands** lie 15 miles south of Evout Islands. The chart and sketches are a sufficient description for the appearance of the coast from Cape Good Success to Cape Horn.

**Hermite, or Cape Horn, Islands** are composed of greenstone, in which hornblende and feldspar are more or less prominent. Their shores are bold and steep-to; the mountains are sharp pointed, with steep ascents, and, being thickly overgrown with shrubs and evergreen trees from their bases to within about 300 feet of their summits, are not easily accessible.

**Hermite Island,** the westernmost of the group, is high and rugged at the east side, but sloping toward Cape West, which is quite low. Wollaston .and Herschel Islands are mountainous. The passages

between them are deep and free from dangers; what few rocks there are show themselves above water or are well marked with kelp. Some rocks extend 400 yards southeastward from Chanticleer Island, at the entrance to St. Martin Cove, but no dangers exist to the southward; these islands may be approached tolerably close.

**St. Martin Cove,** on the east side of Hermite Island, bears from Cape Horn 49°, distant 12 miles, and is further marked by Chanticleer Island, lying about 1½ miles 75° from South Head. In this direction there are no dangers that are not visible, and the cove is easy of access with northeast, east, or southeast winds, but with the westerly ones that prevail here it is quite the reverse, and vessels must then anchor off the entrance in 22 fathoms and warp into the cove to a convenient berth in 18 fathoms, sandy bottom, ½ mile from the head of the cove and about midway from either side. This berth is quite secure, although the williwaws rush down with great violence. These gusts strike the spars aloft without bringing much strain on the ground tackle.

**Tides.**—High water, full and change, in St. Martin Cove is at 3h. 50m., rise 8 feet, but the observations for tide were uncertain on account of the swell.

**Supplies.**—Wood and water are in abundance in every part of St. Martin Cove, but can not always be procured, from the steepness of the shores and the heavy swell that sometimes sets in. The water is highly colored by the vegetable matter through which it percolates, but no inconvenience was found in its use except a somewhat unpleasant taste. The wood was very much twisted and stunted in growth and did not appear fit for any other purpose than fuel.

The shores are skirted with kelp, among which a good supply of fish may be caught with hook and line.

At the head of the cove and a few feet beyond the reach of high-water spring tides abundance of celery is to be found, as also in many other places in the cove.

**Port Maxwell,** about 2 miles north of St. Martin Cove, is a secure anchorage, rather out of the way, but untroubled by mountain squalls or williwaws. Though it has four openings, only two are fit for vessels—those to the north and east. The best berth is in 16 fathoms, sand. This harbor is decidedly good, though it requires a little more time and trouble to make.

The north channel is the better for sailing vessels, but care must be taken of the rock, with 3 feet over it, 750 yards north-northeast of Maxwell Island; also of other rocks lying in mid-channel, one of which dries at half tide.

**Cape Horn** is the extreme southern point of Horn Island. It is 1,391 feet high and presents a remarkable appearance when seen close-to, showing high black cliffs toward the south. Off the west

of the cape are some rocks on which the sea always breaks. Also off the east point of Horn Island there the small rocks above water.

**South Sea Pass,** between Deceit and Herschel Islands at 1 mile west of it, is obstructed by a cluster of barren islets. The best channel through has been found nearest to Deceit Island.

**Deceit Island** is the easternmost of the Hermite Group, and from the eastward its appearance is not unlike Diego Ramirez. Off Cape Deceit, its southeast point, are several rocks above water, and 2 miles southeast of the cape there is a cluster of pinnacle rocks 30 to 40 feet above the sea.

**Herschel Island.**—The northern bay on the northeast coast of Herschel Island, is known as Port Piedrabuena. This port is said to be sheltered, easily accessible, and has a good anchorage in 5½ fathoms, sand and mud bottom. The north and south shores of the bay are fringed with kelp, but at the head of the port there is a sandy beach. Fresh water can be procured from a mountain stream which enters the bay at the southern end of the beach.

**Franklin Sound,** between Wollaston and the Hermite Islands, is clear of obstruction and apparently has no other danger than those shown on the chart.

## WOLLASTON ISLANDS.

**Scourfield and Hately Bays** are on the northeast side of Wollaston Island, but the water is deep for anchorage.

**Middle Cove,** 4 miles northward from Hately Bay, though small, is secure; but when it blows the squalls from the high land are violent.

**Gretton Bay** is an extensive body of water open to the northeast, with convenient depths for anchoring. There is a narrow but deep channel, named Washington, connecting the head of this bay with Franklin Sound. The flood current sets to the northward through this passage. Victoria Channel joins Gretton Bay with Beaufort Bay; is narrow and full of rocks.

**Daedalus Rock,** 3 feet under water, 45° from Daedalus Island, distant ½ mile, and Hazeltine Rock, 16 feet under water, 82° from the same island, and distant about 2 miles, are dangers to be avoided in entering this road from the northward. Other rocks are reported to the south and west of Hazletine Rock.

**Banner Shoal,** 1,400 yards 120° from Dillon Point, the northwest extreme of Gretton Bay, is marked by kelp; it has 2¾ fathoms over it, with 7 fathoms midway between it and the shore.

**North Road,** in the northern part of Gretton Bay, is easy of access, comparatively well sheltered, and a very good stopping place for a vessel working through Nassau Bay.

**Otter Anchorage,** between Otter and Diane Islands, is easy of access and fairly well sheltered.

**Seagull Anchorage,** small but well sheltered, is formed by the islands fronting Victoria Channel. It is only fit for small vessels of light draft. The best berth is in 4 fathoms west of Gun Point.

**Romanche Anchorage** is between Otaries and Bayly Islands and forms the approach to Seagull Anchorage.

**Washington Channel—Brown Rock.**—The shoal on which the Argentine cruiser *Almirante Brown* struck has a least depth of 10 feet over it and is located 3,300 yards, 209° from Iron Cape, about in the middle of the channel.

The rock consists of a rocky patch, elliptical in shape, with depths of 2¾ fathoms over it. The shoal is 97 yards long in a north-northwest and south-southeast direction and 69 yards wide.

Mariners are cautioned against passing between Great Bank and Whistler Point, as this vicinity and the coast of Wollaston Island lying northward of Whistler Point are unexplored.

**Nassau Bay** is between Navarin Island on the north and Wollaston Islands on the south. It extends to the northwest through Ponsonby Sound and the Murray Narrows to Beagle Channel, and has many anchorages on each coast. The northern shore is low, particularly near Guanaco Point, whence the coast changes its level land and low earthy cliffs for rocky heights. In Ponsonby Sound there is anchorage with good holding ground on the east side of Button Island, northward of a chain of flat wooded islets extending from the southeast point of the island.

**Caution.**—In Nassau Bay the compasses are much affected; they become very sluggish, and might cause serious errors if not carefully attended to.

**Button Island—Shoal.**—A patch of kelp, indicating shoal water, exists about half way between Button Island and the group of islets about 1 mile farther southward, in Ponsonby Sound.

**Rock.**—A rock marked by kelp, with 15 feet water over it, lies just outside July Bay, on the east side of Button Island, a little less than 400 yards 23° from the 32-fathom spot shown on the charts.

Douglas Bay, in the southeast part of Ponsonby Sound, affords anchorage close to the shore. The holding ground is good, but is exposed to westerly winds and sea.

**Mission station.**—About 1 mile up the Douglas River, which empties into Douglas Bay, is located the Rio Douglas Mission Station, where shipwrecked seamen may find refuge.

**Cape Webley—Wreck.**—The barge *Brunel* struck a submerged rock and lies sunk, with only a small portion of the bow above water, about 2.5 miles 40° from Cape Webley.

**Rock.**—A rock, on which the *Brunel* struck, is located 3½ miles 107° from Cape Webley, the eastern end of Pasteur Peninsula, Hoste Island; there is a least depth of 8 feet on the rock, and 52 feet at 110 yards distance all around, rocky bottom.

**Hardy Peninsula,** a projection of Hoste Island, affords several anchorages on its eastern side. Its southern extremity, False Cape Horn, is a very remarkable headland, and from the east or west resembles a large horn.

**Allen Gardiner Bay,** so named in memory of the missionary seaman who founded several mission stations on the southern islands of Tierra del Fuego, is the middle of three bays, located on the northern coast of Hardy Peninsula. The bay is 2 miles long and from 600 to 800 yards wide, having depths of from 8 to 11 fathoms, gravel bottom. The bottom is even and the holding ground good. The anchorage is near the head of the bay in 8 fathoms of water. It is spacious and sheltered from the prevailing winds, which do not produce here the strong and frequent squalls that are so common in this archipelago. There are no hidden dangers, a little patch of kelp located northeastward of the anchorage having depths of 6½ fathoms over it.

To enter Allen Gardiner Bay, which can be recognized after rounding Packsaddle Island and before reaching the Bracey Group, located northwestward of Packsaddle, consisting of four islets contiguous to and separated from the coast, pass between Pringle Islets, of which there are only two, and Asmussen Islet at the western point of Navidad Bay, giving this point, off which there is kelp for some distance, a berth of from 600 to 800 yards.

No provisions or supplies can be obtained here, but good water is easily procured from a stream that empties into the bay.

**Navidad and Concepcion Bays,** located, respectively, to the eastward and westward of Allen Gardiner Bay, are useless for purposes of navigation, the former having some rocks and kelp and the latter having inaccessible shores and being difficult of access.

**Packsaddle Bay,** on the northeast side of Hardy Peninsula, is sheltered from northwest winds by an island resembling a packsaddle. It is safe and roomy, but not so convenient as Orange Bay, 5 miles to the southward.

**Orange Bay** is considered one of the best harbors on the coast; although it is open to the eastward, Wollaston Islands are a protection against the heavy sea from that quarter.

Off the bay anchorage depths extend to 2 miles from the land. The opening of the bay is 4 miles wide, and in that part are 18 or 20 fathoms, fine speckled sand. Two islands, the larger having a down-like appearance, lie in the middle; behind them is the harbor, a square mile of excellent anchorage, without a rock or shoal, well

adapted for a large fleet, and where they could be supplied with any quantity of wood or water. The best watering place is in Water Cove, on the north side of the bay. In the two creeks at the south side there is good anchorage for small vessels, in 20 to 5 fathoms, fine speckled sand. The land in the vicinity is low, comparatively speaking, and the williwaws are consequently not violent. A vessel may close the shore to a moderate distance in every part; therefore no directions are necessary to point out the way to the best berth, which is marked in the plan. Off the north point of the bay there are several small islets, which must not be approached too closely.

**Tides.**—High water, full and change, in Orange Bay is at 3h. 36m.; springs rise about 9 feet.

**Schapenham Bay,** the next islet south of Orange Bay, is 1½ miles wide, having near the middle a small black rock above water. A quantity of kelp, lying over a rocky bottom, is seen at the head of the bay, and a large waterfall marks the place distinctly. There is an anchorage in 10 to 15 fathoms near its south point, but it is not recommended. The land behind is high and rugged; two singular peaks which resemble sentry boxes show themselves. Near the shore the land is low compared with other parts of the coast and has not the iron-bound, forbidding appearance of the more westerly shores. From the heights sudden, very strong squalls blow during westerly winds. Being generally a weather shore and regular soundings extending along it, there is no difficulty in approaching or choosing an anchorage.

**Rice Bay,** 2 miles south of Schapenham, is inside a small island, and, although small, is landlocked and a safe anchorage. Depths of 6 fathoms were found in this anchorage.

A bark was beached for repairs abreast the stream at the head of the bay, on a level sandy bottom, and remained there five days. Fresh water and wood for fuel were plentiful.

**Lort Bay,** 5 miles south of Schapenham, is about 2 miles wide, with a fair anchorage in 14 or 15 fathoms, sandy bottom. Rocks above water lie off the northern shore.

**Coralie Cove.**—South of Hardy Peninsula, in Romanche Channel, is Coralie Cove, where a vessel might obtain temporary shelter, but the space is confined.

**Diego Ramirez Islands** cover a space of nearly 5 miles in a north and south direction. North Rock is about 56 miles 241° from Cape Horn. The height of the principal island is 587 feet. A vessel may pass between the northern group and that to the southward. Detached rocks lie off the southern island; all the outer ones are above water. The southern, or Boat Island, has a cove at its northern corner where boats can land and where water may be procured on the point close to the eastward of the landing place.

**Ildefonso Islands** extend in a northwest and southeast direction for 5 miles and rise above the sea level about 100 feet. The southeast point of the islands is about 42 miles distant and bears 258° from False Cape Horn. They appear to be the remains of a mountain ridge broken through in many places by the sea. Vessels may pass close to them, for there is no danger.

**New Year Sound,** on the west side of Hardy Peninsula, is a large tract of water studded with islands and extending about 20 miles in a northwest direction, terminating in four arms; these arms are very deep, but mostly end in coves, where a vessel could moor. An arm extending to the northeast is separated from Ponsonby Sound by an isthmus about ½ mile across, over which the natives haul their canoes. Between False Cape Horn and New Year Sound there is a tract of broken land fronted by islands; between these islands and Hardy Peninsula there is a channel ½ mile wide, affording two anchorages, sheltered from southwest winds.

**Indian Bay,** within the entrance of the sound, on the western shore, is not recommended; the bottom is rocky, with deep water.

There are two anchorages on the east side of Morton Island at 36 miles west by north of False Cape Horn, but the water is very deep, and they are not recommended. Mount Beaufoy, 1,739 feet high, on Henderson Island, at the entrance of New Year Sound, is a sharp-pointed hill, visible at a great distance; from its summit the Diego Ramirez Islands were seen, though upward of 50 miles distant. A dangerous reef lies 2 miles 180° from Brisbane Head, the south point of Henderson Island.

**Clearbottom Bay,** at the north end of Morton Island, is small and affords indifferent shelter in strong westerly winds. Wyatt Cove, in the southeast part of Hind Island, is a better place, but is not sheltered from southerly winds.

Leading Hill, on Hind Island, is a remarkable double-peaked height, which is visible from a distance of 18 or 20 miles; it points out the entrance to Duff Bay.

Neither Rous Sound nor Trefusis Bay to the westward afford anchorage places. There are no known sheltered coves fit for anchorage in the Wood Islands; passages and broken land lie behind them to the northward.

**Talbot Passage,** separating the Wood Islands on the west side of Trefusis Bay from Hoste Island, is only ¼ mile wide in the narrows; several rocks and islets obstruct the southeast entrance, and this passage should not be attempted by a sailing vessel. There is an anchorage in Angot Cove, at the entrance of Talbot Passage, under the lee of Caroline Island, the easternmost of the Wood Islands, but it can not be recommended.

**Christmas Sound** has no hidden dangers, Little and Great Black Rocks being in plain view on entering. Adventure Cove is the easiest of access, but it is so small that it will afford shelter for not more than one vessel at a time.

**Waterman Island** may be recognized by its remarkable heights, the southern one being named, by Capt. Cook, York Minster, from its fancied resemblance to that building. He describes it as a "wild-looking rock." There are several rocks and islets close to the eastward of this height. One lies 2 miles 105° from the extemity of the Minster, on which the sea breaks violently; a vessel may pass close to it. Off Great Black Rock are several breakers caused by rocks under water. Among these islands there is but very little current.

**Capstan Rocks,** 8 miles west of York Minster and 4 miles south of the western point of Waterman Island, are about 20 feet out of water, with breakers extending ½ mile north and 3 miles westward of them. They should be given a berth of 5 miles when passing westward of them.

**March Harbor,** on the east side of Waterman Island, is large, with good holding ground, but there are many rocky places, and on a sunken rock marked by very thick kelp there is only 1 fathom.

**Port Clerke,** about 1 mile to the northward of March Harbor, is secure when inside, but, from its situation, is exposed to very violent squalls. It is accessible only to steamers. The passage to it from the northward is obstructed by rocks, so that the coast of Shag Island must be kept close aboard until abreast the entrance. When entering the port the south shore should be neared; vessels moor in the inner part of the harbor, on a mud bottom; good holding ground.

**Webb Inlet,** on the southwest side of Hoste Island, has two arms; one extends 18 miles in a northeast direction and terminates at a low isthmus; the other arm extends about 3 miles in an easterly direction.

**Rufales Bay.**—Anchorage was also found in this bay just northeast of Cape Kekhlao, the west extreme of Cloue Peninsula (Hoste Island), but it is not recommended.

**Cook Bay** is the large space between Waterman Island and Londonderry Islands at 12 miles west of it, but broken land, islets, and breakers surround and make it unfit for the approach of vessels. On the east side of this bay there is an entrance to Beagle Channel, and to the northwest a passage to Whaleboat Sound, but both are unfit for sailing vessels, excepting with a fair wind.

**Londonderry Islands** consist of a group about 28 miles in extent. Treble Island, the southwesternmost of the group, is remarkable, having three peaks, and is visible from a considerable distance; near it are some straggling rocks, shown on the chart. Phillip Rocks, lying about 5 miles southwestward from Cape Alikhoolip, the

south cape of these islands, are dangerous, though above water, because so far from the shore and so low. Between these rocks and Treble Island the space is foul. Vane Pass, on the northwest side of the islands, has two shoals in its northern entrance, with 15 and 18 feet of water, respectively.

**Gilbert and Stewart Islands,** the next group westward of Londonderry Islands, have between them an open space, named Adventure Pass, with deep water.

**Doris Cove,** on the northeast side of the eastern Gilbert, is a safe anchorage for small vessels, with no hidden dangers in the vicinity.

**Stewart Harbor** is just north of the high and remarkable western promontory of Stewart Island, Cape Castlereagh. Though not large, this harbor is an excellent place for small vessels, having three openings and being easy of access with any wind. The anchorage is in 6 fathoms of water under the lee of Shelter Island. Two rocks just awash at high water lie nearly in the middle of the harbor, and a rock on which the sea breaks lies about 1 mile west of the middle opening. There is no other danger. Wood and water are plentiful and easily obtained.

**Camden Islands** lie off Brecknock Peninsula, the western extreme of the main island of Tierra del Fuego. The islands have several passages between and to the northward of them, with deep water and anchorages opposite most of the valleys, where small vessels could find shelter. Brecknock Pass is wide, free from danger, and is to be preferred when entering or leaving Barbara Channel so as to avoid passing Furies Rocks.

**Townshend Harbor** is a safe anchorage, with Horace Peak pointing out its position. After passing the rocks, on which the sea breaks violently, off the entrance of Pratt Passage, the navigator, in working into this harbor, must depend upon the wind lasting, as there are no soundings in less than 50 fathoms until just off the anchorage place. The holding ground is excellent, and, though tremendous squalls come off the high land to the westward, there is no fear of the anchor starting.

**The Furies.**—In the space between London and Fury Islands rocks show themselves in every direction, the East and West Furies being the most remarkable. They lie on a northward and westward bearing from Cape Schomberg, the former 4 and the latter 9 miles from that promontory. In a line between them, and 3 miles from West Furies, is a solitary rock, from which Mount Skyring bears 12° 12½ miles. The Tussac Rocks are 4½ miles 72° from the West Furies, with no outlying dangers. Vessels standing in with a westerly wind should pass near the West Furies and steer for these rocks. After passing them there are no known dangers in the entrance to Cockburn Channel.

**Melville Sound** is completely filled with rugged and desolate islands. Among the Magill Islands, on the southeast side of Melville Sound, there are several coves and anchorages. Mount Skyring, on Mount Skyring Island, is 3,000 feet high.

**Port Tom,** on the southeast side of Mount Skyring Island, is good and well sheltered, except from the violent squalls off the high land. It is more safe and secure than Fury Harbor.

**Fury Harbor,** on the southeast side of Fury Island, has but little shelter and bad holding ground. From its nearness to the Furies and Tussac Rocks, where seals are found, this harbor is much frequented by the sealers.

**North Cove,** on the northeast side of Fury Island, is a snug temporary anchorage for small vessels.

**Bynoe Island,** 3 miles north of Skyring, affords anchorage on its northeast side; and Hewett Bay, on the west shore of Barbara Channel, is a good stopping place either for entering or leaving the channel.

A patch of kelp, about 2 miles long, northwest and southeast, was observed by the Chilean corvette *Magallanes* in 1878 about a mile south of the westernmost Bynoe Island; a depth of 13 fathoms was obtained near the north and 11 fathoms near the south side of this patch. When passing between Mortimer and Kempe Islands, on the north side of Melville Sound, no bottom was obtained at depth of 30 fathoms in the bights of the Mortimer Island shore.

The *Magallanes* anchored in 14¾ fathoms between some patches of kelp extending from the southeast and southwest points of an island 1½ miles west of Mortimer Island. A short distance west of this anchorage there is a large patch of kelp with several sunken rocks.

**Cockburn Channel,** having the same entrance into the Pacific as Barbara Channel, runs in an easterly direction along the south side of Clarence Island for 40 miles and into Magdalen Sound in Magellan Strait. In working through this passage the south shore ought to be preferred, as it is usually a weather shore, and it seems to be better provided with coves and inlets in which a vessel may find it convenient to anchor. King and Fitz Roy Islands, as well as Kirke Rocks, are bold and steep-to.

**Rocks.**—Two rocks are plainly visible above water in the entrance to Cockburn Channel. One rock lies about 10½ miles 168° from Mount Skyring and appears to be identical with Leon Rock, which is shown on the charts. The other lies northeastward of Tussac Rocks, about 7½ miles 171° from Mount Skyring.

**Prowse Islands,** on the south shore of Cockburn Channel, are numerous, and skirt the coast for several miles. There are anchorages among these islands; behind them the land trends in and forms

a deep sound. A vessel in want of anchorage should send a boat and wait in the offing until good anchorage be found; and when about to enter one of these deep-water bays a boat should always be ready to carry a hawser ashore. It will frequently be necessary in sailing vessels to tow up to the head of the harbors, for, from the height of the land, the wind generally fails or becomes baffling. The distance across the channel between Prowse Islands and Barrow Head on the north side of the channel is scarcely 1½ miles.

**Dyneley Sound,** the first opening on the north shore of Cockburn Channel, extends for more than 9 miles in a northerly direction, and is joined to San Pedro Sound on the south shore of Magellan Strait by a channel having 5 fathoms in the narrows. On the west side of Dyneley Sound there is a group of islands, affording several anchorages.

**Eliza Bay,** just within the entrance to Dyneley Sound on the southern shore, affords shelter from northwesterly and southwesterly winds. In entering steer midway between Baynes and Dyneley Islands until a large patch of kelp (having several rocks awash at low water) is seen; this should be passed at a distance of 100 yards; thence steer for an island on the west side of the bay and anchor in 16 or 17 fathoms. There are several patches of kelp in Eliza Bay in not less than 6 fathoms of water. Small vessels may anchor in either of two small inner bays sheltered from all winds. Vessels entering the bay without local knowledge should have a boat ahead sounding.

**Mercury Sound** is separated from Dyneley Sound by an island, the southern part of which is Barrow Head.

**Port Barrow,** situated near the southwest extreme of Barrow Head, is a small bay, about half a mile in depth, and affords anchorage for a large vessel in the center of the entrance, in a depth of 13 fathoms, sand and mud. Small vessels can proceed farther in, taking care to avoid a rock, nearly awash at low water, which lies near the western coast. Two cascades fall into the head of the port and can be plainly seen from the channel.

**Port Soffia,** on the west side of the entrance to Mercury Sound, is situated just to the northward of the southeast point of Barrow Head. It extends for about a mile to the northwestward and has a uniform width of a quarter of a mile. Good anchorage can be obtained about half way up the port in 17 fathoms, or near the head in 8 fathoms; the bottom in both places being of sand and mud affords excellent holding ground.

There are no dangers in the port, and it is easy of access. Three small islands, the highest being 39 feet high, are situated on its southern side. Water can be obtained from a rivulet at the head of the port, and wood is abundant.

**Park Bay,** on the east side of the entrance to Mercury Sound, affords a good anchorage in 12 fathoms, sand and mud. It and Stormy Bay have the same disadvantage, as they are on the lee side of the channel and consequently difficult to leave. There is, however, more room to work out, and no dangers to encounter but what are visible. At the head of the bay a narrow isthmus, not more than 500 yards across, separates it from Mercury Sound, which has not been examined; it is represented on the chart from an eye sketch.

The best anchorage in Park Bay is in 12 fathoms, shell, in the center of a cove west of the innermost island of the bay. This cove is about 400 yards wide and 300 yards deep, with 6 to 17 fathoms water. Anchorage may also be obtained in 17 fathoms between the island and a small point farther in the bay; there is, however, a patch of kelp in the vicinity having 2 to 4 fathoms. Northward of the cove there is a small cascade. Wood is plentiful in Park Bay.

**Stormy Bay,** 7 miles southeast of Park Bay, is a very wild, unsheltered place, unfit for any vessel to enter. At the anchorage the water is deep, 17 to 20 fathoms, and the bottom rocky. In the bay are numerous shoals, but, though they are all marked by kelp, they narrow the channel so much as to render the entrance and exit both intricate and difficult for any but a small and handy vessel.

**Warp Bay,** the next opening, and just west of Cape Turn, though small and exposed to southerly winds, is a convenient stopping place.

**Adelaide Passage,** between the broken land of Clarence Island and the Magill group, is about 13 miles long, connecting Cockburn and Barbara Channels.

Good anchorage may be had in the cove on the northern shore of Enderly Island in 33 feet of water.

**Tides.**—In Barbara Channel the flood stream was found to set to seaward or to the southward, as was also the case in Cockburn Channel; but the whole system of tides in this great archipelago requires a careful investigation.

**Barbara Channel,** leading into Magellan Strait at English Reach, has its southern entrance so encumbered with islands and rocks that no one direct channel can be specially recommended, and the chart must be referred to as the best guide for its navigation. For small vessels there is neither danger nor difficulty; and there are numerous anchorages that they may reach without trouble. The rocks off the entrance of this channel should be passed only during daylight and in clear weather, so that a vessel may be steered more by a good eye at the masthead than by any chart. Four remarkable mountains point out the entrance distinctly. The peaks on Kempe Island are high and show three points. The peaks on Fury Island are high and divided. Mount Skyring is high and has a single peak. Mount

St. Paul, from near Fury Island, appears like the dome of the cathedral, the name of which it bears.

The Channel separates Clarence Island from Santa Ines, the next large island west of it, and is about 38 miles long from Magill Islands in the Pacific to Charles Islands in Magellan Strait.

**Hewett Bay** is the first anchorage on the western shore of the southern entrance of Barbara Channel; there is anchorage in 9 fathoms in its north part. The anchorage is smaller than shown on the chart. Between Hewett and Nort Bay the channel is so strewed with rocks and shoals, some only showing at half tide, that much caution is necessary in its navigation; all patches of kelp should be avoided. A submerged rock lies about ⅜ mile 158° from the islet located between Mortimer Island and the island eastward of Hewett Bay. The tidal currents are much stronger to the northward of Nort Bay than to the southward.

The country hereabouts has a more agreeable appearance, being better wooded with beech and cypress trees.

**Brown Bay,** 2 miles northward of Hewett Bay, is more extensive, and affords shelter in a small cove at the north entrance in 8 fathoms, sand.

**Nort Bay,** 4 miles north of Brown Bay, is tolerably secure for small vessels, but it is not to be recommended.

**Bedford Bay,** on the western side of the narrow part of Barbara Channel, at about 9 miles north of Nort Bay, has good holding ground, with depths of 20 to 8 fathoms and well sheltered from the prevailing winds. At its entrance are several patches of kelp, the eastern one having 4 fathoms of water on it.

**Nutland Bay,** 5½ miles northward of Bedford Bay, has from 8 to 15 fathoms over a sand and mud bottom. Its position may be known by two rocks named Hills Islands, which lie 1 mile northward from the anchorage. Between Bedford and Nutland Bays, and, indeed, so far as Shag Narrows, the channel is open and may be navigated without apprehension. There are many bays and inlets which, though not here described, might be conviently occupied, but all would require to be previously examined, for though they all trend far enough into the land to afford good shelter, yet in many the bottom is foul and rocky and the water too deep for anchorage. The western, being the windward shore, should of course be preferred.

**Broderip Bay,** 3½ miles northward of Nutland Bay, has in its northern part some good coves, and a very convenient one at its eastern extremity. This cove extends to the northward for about ⅛ mile, affording good anchorage in 10 fathoms, sufficiently well sheltered and distant from high land to be free from williwaws. Round the cape north of this cove is Icy Sound, a deep inlet with a glacier of considerable extent, from which large masses of ice are

constantly falling and drifting out of the inlet. The water is deep, and the anchorage should not be chosen when there are so many better places.

**Dean Harbor,** the next opening north of Icy Sound, is a considerable inlet, trending in under the same glacier and extending to the head of Smyth Harbor, as well as to a great distance into the interior. If of a favorable depth it might afford good anchorage, but it has not yet been examined.

**Field Bay,** nearly 2 miles east of Icy Sound, is too much exposed to southerly winds to be recommended as a stopping place, unless the wind be northerly. Nutland Bay is a more convenient place to start from with a view of passing the narrows.

**Shag Narrows,** west of Cayetano Island, is the only navigable passage between the channel and Magellan Strait. Although the breadth of the opening is at least 1 mile the eastern portion is so filled up with rocky islands and shoals that the actual navigable passage is not more than 120 yards across at the northern part, and the width at the southern end scarcely ½ mile. The whole length is not more than 2 miles. It is formed on the western side by a projecting point of high land, and on the opposite side by three islands, the northern one of which is Wet Island, and the southern Mount Woodcock. All the space to the eastward of the last-mentioned one is so foul that the passage is as difficult as it is dangerous.

**Tides.**—In Shag Narrows at full and change the stream commences to set to the southward at 12h. Through them the tidal streams attain a velocity as great as 7 knots, but the sides of the rocks being steep-to, no danger need be apprehended in passing them, notwithstanding the want of room for working ship. At Wet Island the stream of the ebb divides, one part setting around the island to the eastward, while the principal volume sets through the narrows. In the same manner the southern or flood stream, after passing Wet Island, sets to the southeast round the eastern side of Mount Woodcock.

**Directions.**—To avoid the danger of being thrown out of the narrows, it is only necessary to keep the western shore aboard; where there are no indentations the tide will carry a vessel along with safety. At the northern end of the narrows, on the western side, there is a shelving ledge with only 5 fathoms water; and there is an eddy, but as soon as the vessel is once within the narrows (that is, inside Wet Island), the mid-channel may be kept. When shooting this passage in a sailing vessel it would be better to furl the sails and tow through, for if the wind be strong the varying and violent squalls would be very inconvenient, sometimes baffling, and sometimes almost laying the vessel upon her beam ends, though every sail be furled. It will be necessary to have a couple of boats

out, ready to tow the vessel's head round, and also to prevent her being thrown by the tide into the channel to the southward of Wet Island.

For a sailing vessel requiring to pass through Barbara Channel from the northward it would be advisable to stay at Fortesque Bay, on the north shore of Magellan Strait, until a favorable opportunity should offer, for with a southwest wind it would not be safe, even if practicable, to pass Shag Narrows.

If anchorage be desirable on leaving the narrows there is none to be recommended until the coves between Smyth Harbor and Cape Edgeworth be reached. Of these, Dighton Bay is the best; the anchorage is off the sandy beach in 20 fathoms. Warrington Cove, the next to the northward, also offers good shelter and anchorage, but both are exposed to easterly winds.

Edgeworth Shoal, lying ½ mile southeast of Cape Edgeworth, is so thickly covered with kelp as to be easily seen when approaching it; there is not more than 2 feet of water over its shoalest part.

**Smyth Harbor,** the first opening north of the narrows, is about 4 miles long in a westerly direction, from ½ mile to 1 mile wide, and surrounded by high land. The water is deep, excepting in Earle Cove, on the north side, where vessels might lie, if necessary; but it would probably be a very wild place in bad weather. The hills at the head of the bay are capped by glaciers that communicate with those at the head of Icy Sound, and all the mountains between this place and Whale Sound, in the strait, appear to be entirely covered with a coating of ice.

**Tides.**—High water, full and change, in Smyth Harbor, is at 12h.; springs rise 6 or 7 feet.

**Agnes Islands,** the group to the northwest of the Magill Islands, and those in their neighborhood, do not require any description. They are so fortified by outlying rocks as to be unfit places for the approach of any vessel. Northward of them is Stokes Bay, and to the eastward a number of islands, between which lies the southwest entrance to Barbara Channel. A rocky shoal extends ⅔ mile to the north-northeastward from the northeastern extremity of Lort Island. A vessel ought not to get entangled in the labyrinths; if so it will be necessary to navigate by eye, for neither chart, directions, nor soundings would be of much assistance, and in thick weather the situation would be most precarious.

The group consisting of the four easternmost islands between Mortimer and Lort Islands is known as the Dora Islands.

The channel between the northwestern island of the Dora group and the island of St. Ines is about 1 mile wide.

Vessels may anchor in the bay on the eastern shore of the easternmost of the Dora Islands in 50 to 60 feet of water, sandy bottom.

The Pleiades Islands is the group of seven islets, with numerous rocks, located westward of Stokes Bay and 5 miles north-northwestward of Lort Island.

The three westernmost islands of the Pleiades Group are located about 1 mile farther south than shown on the chart.

Anchorage may be obtained southward of the two largest islands in the westernmost port of the Pleiades Group for vessels up to 325 feet in length.

**Noir Island,** 17 miles in a southwest direction from Kempe Island, is the outlying islet of this labyrinth; it is about 600 feet above the sea, with a remarkable neck of land to the southwest, having on its extremity a rock resembling a steeple or tower. One mile south of this point there is a sunken rock, over which the sea occasionally breaks; two other breakers are in the bight close to the point. On the south shore of this island there is a cove which would be safe for boats in any weather. Wood and water are easily obtained.

**Noir Road,** on the east side of Noir Island, is an excellent roadstead, with a sandy bottom, where vessels may lie secure from all westerly winds. A rock lies in the road, and another, which is very dangerous, lies 4 miles to the eastward, as shown on the chart.

**Tower Rocks,** lying 7 miles south of Noir Island, are high and steep-to, and may be passed tolerably close on either side.

**Caution.**—Between Cape Schomberg on London Isle and Noir Island lie many reefs, and a great number of detached outlying rocks, which render this part of the coast extremely dangerous and unfit for vessels. No chart could guide them; they must trust to daylight and clear weather, with a good lookout, if necessary to enter or leave Barbara Channel.

**Milky Way** is the name given to the space lying between Noir Island and those to the northward and eastward. All this ground is more or less strewn with rocks just awash or a few feet above water, and on them the sea breaks continually. It is advisable to avoid all this part of the coast.

**Grafton Islands** are high, extending northwest and southeast about 20 miles, and the remarks on the general character of this coast are applicable to them. Between them are several sheltered inlets, but the best and easiest of access is Euston Bay. Northward of these islands lies Wakefield Passage, made use of sometimes by sealing vessels. Hope Harbor is sometimes used by these vessels.

**Isabel Island,** the southeast of the group, has an anchorage, but is only fit for small craft. There are several rocks off the south point of this island. The Kennel Rocks are 3 miles to the southward, and 3 miles 304° from them is a rock just awash.

**Cape Gloucester,** the western extreme of Charles Island, the largest and westernmost of the Grafton Islands, is a prominent head-

land, and can not easily be mistaken. At a distance it appears to be a high detached island, but on approaching it a low connecting isthmus will be seen. A rock on which the sea breaks lies nearly a mile to the northward of west from it; there is no other danger and the cape may be passed tolerably close-to.

**Euston Bay** is one of the best anchorages on this coast, as it can be approached and left without risk with any wind. When coming from the westward after rounding Cape Gloucester, Ipswich Island will be seen to the southward and eastward, distant 7 miles. In rounding Ipswich Island, give it a good berth to clear some rocks under water, upon which the sea does not always break.

After clearing these rocks, pass close to Leading Island, and then steer for the opening of Laura Harbor, which will be seen under a high-peaked mountain. There is water in the bight for a moderate-sized vessel, but it is better suited for a small vessel. Large vessels should anchor in the bay. This bay is large, with a bottom even and good, exposed only to southeast winds, which come on gradually and seldom blow hard. The depth varies from 5 to 20 fathoms; a large patch of kelp lies across the entrance to the harbor, but there is no danger beneath it except in one spot, where there are only 4 fathoms.

**Tides.**—High water, full and change, at Euston Bay is at 1h.; springs rise 6 feet.

**Fincham Islands** lies 21 miles northwest of Cape Gloucester, the space between being known as the Breaker Coast, a long stretch of wild coast line full of rocks and breakers exposed to all the strength of the westerly gales. It is utterly unfit for the approach of a vessel.

**Cape Tate,** about 8 miles northwest of Fincham Islands, is rather high and rounded at the summit. There are numerous clusters of rocks off it to the westward and northward, only visible when near the land. They are known as the College Rocks. This part of the coast is very dangerous and should be avoided.

**Otway Bay** is an extensive body of water surrounded with broken land, islands, and rocks. Passages lead from thence to Magellan Strait through Dynevor Sound and Sea Shell (Abra) Channel. Sea Shell Channel is a navigable passage and may be useful to a vessel embayed in Otway Bay.

**Gonzales Harbor.**—On the northern coast of Childs Island there are two bays, the larger and more easterly of which is called Gonzales Harbor. Here good anchorage can be had in from 8¾ to 9¾ fathoms, with bottom composed of small broken shells.

Southward of this anchorage and in deep water a belt of kelp extends parallel to the shore. A brook containing good water flows into the head of the harbor, but this is difficult of access for boats

owing to the thick off-lying beds of kelp. Wood is abundant and there are plenty of mussels on the beach.

Gonzales Harbor may be used as a refuge for the shipwrecked, and a well-manned boat could easily make Punta Arenas.

From the largest island of the Sara Group, which is situated northeastward of Childs Island and indicated on the chart as one island with a dotted coast line, the course to Gonzales Harbor is 216° 30′.

**Childs Island—Breakers.**—Breakers which give every appearance that a shoal has formed lies 1½ miles northward of the small islet northwestward of Childs Island.

Also a stretch of kelp was observed about 1¾ miles northward of the northeastern point of Childs Island.

**Landfall Islands,** 19 miles northwest of Cape Tate, were named by Capt. Cook from seeing them first when he visited this coast. Cape Schetky is a remarkable double-peaked height; there are some rocks just awash about a mile off it. Off Cape Inman, another prominent headland, there are several detached rocks on which the sea breaks violently. The outer one is not more than 2 miles from the shore, and shows itself plainly.

**Latitude Bay** is a good anchorage, although exposed to a swell thrown in by heavy northwest winds. Between the Landfall Islands there is a snug berth in security with smooth water for a vessel drawing not more than 12 feet. She must moor in not less than 10 fathoms as close to the western shore as possible, with an anchor to the eastward in the event of the wind coming from that quarter. Wood and water are plentiful.

**Tides.**—High water, full and change, in Latitude Bay is at 2h.; springs rise 4 feet.

**Week Islands,** nearly 6 miles northwest of Landfall Islands, are separated from Desolation Island by Murray Passage. At their south side is a roadstead with good holding ground in 18 or 20 fathoms, coarse gravel and sand with patches of rock, but being exposed to southerly winds and to those from the west can not be recommended as an anchorage.

**Saturday Harbor.**—Between the islands a small vessel may find a snug berth in Saturday Harbor, quite secure but difficult of access, in 24 fathoms, good holding ground. As before said, the eye must be the chief guide in entering most of these places; they are of one description—inlets between high ridges of land, having, generally, deep water and kelp marking the rocky places. Flaws of wind and violent gusts off the high land render the approach difficult and to a large sailing vessel impracticable.

**Cape Sunday,** the western point of Graves Island, the largest of the Week Islands, is a high and prominent headland with several islets and dangerous rocks off it. Barrister Bay opens out just after

passing this cape. It is too much exposed to be of any use as an anchorage place.

**The coast** from abreast Graves Island trends in a northwesterly direction 28 miles to Cape Deseado, the west extreme of Desolation Island, thence 2 miles northeasterly to Cape Pillar. At about 15 miles northwestward of Week Islands is Cape Deseado, the highest cape hereabout, and remarkable. A rocky islet, named Black Islet, lies 1 mile off this cape, and 2 miles to the southeastward of this islet there is an opening between a group named Cotesworth Islands and Desolation Island, which has not yet been examined.

**Soundings.**—The 50-fathom line appears to extend about 20 miles offshore along this southwestern coast of Tierra del Fuego, the bottom being coarse sand.

**Dislocation Harbor,** at 3 miles northwest of Cape Deseado, is a place of refuge for an embayed or distressed vessel, but unfit for any other purpose. The position of the harbor is pointed out by the heights, named Law and Shoulder Peaks; they are the most remarkable on that part of the coast. Its entrance is rendered difficult to the eye by rocks, on which the sea breaks violently, and by two rocks under water, on which the sea does not always break. Water may be easily obtained; the boats can lie in a stream which runs from the mountains. Wood is plentiful.

**Weather and Lee Rocks,** off the entrance to Dislocation Harbor, the former 2¾ miles 298° and the latter 3½ miles 199°, make exit from the harbor difficult, and as the entrance is narrow and exposed to the prevailing wind and swell, a sailing vessel, once in the harbor, might be for days unable to get out.

**Directions.**—To find the entrance of Dislocation Harbor, steer for the peaks, look out for Weather and Lee Rocks, both several feet above water, the sea breaking violently on them, and when within 4 miles of the shore the opening will be seen distinctly from the masthead. In going in avoid the two rocks at the entrance and anchor in the innermost part. The prevailing winds send in a swell; the place is, however, quite secure, but only a small ship can get out again without a fair wind. Four small vessels may lie in security. The bottom is very even, from 15 to 25 fathoms, fine white sand.

**Judge and Apostles Rocks** are from 5 to 50 feet above the sea, but many breakers near them indicate an extensive reef. The outer rock is 4 miles from the land.

**Cape Pillar,** the northwestern extremity of Tierra del Fuego, forms the southwestern point of entrance to Magellan Strait. It is a bold cliff, and may be recognized from the westward by four peaks, the most southern being the highest. The shore is steep-to, there being a depth of 60 fathoms at 1 mile from the pitch of the cape.

Cape Pillar, though conspicuous for its height, is more so on account of the two peaks which rise from its summit, with an inclination to the the northwest; the eastern and higher one belongs to a mountain from which the cape springs, but the western one is a kind of tower, the base of which is on the shore west of the cape, and is of a form to which the name "pillar" might reasonably be given. The extremity common to the strait and to the Pacific Ocean is a large detached rock, 310 feet high, which shows the disposition of the strata of which it and the cape are formed. That part of the cape which is washed by the waters of the strait presents a round hill, not very high, while the western part, exposed to the fore of the Pacific Ocean, exhibits large excavations, made by the sea in the rock.

**Tides.**—At Cape Horn high water, full and change, is at 3h. 30m.; at York Minster at 3h. and at Cape Pillar at 1h. At the intermediate places the time gradually changes between those limits; and the rise varies from 4 to 8 feet.

The tides on the coast between Cape Horn and Cape Pillar are regular as regards their rise and fall and time of high water; but not so with respect to the velocity and direction of the stream. Properly speaking, there appears to be no tidal stream but rather a constant current setting from Cape Pillar to the southeastward toward Cape Horn. With the rising tide this current is accelerated, and with the falling tide retarded. But more observations are required.

Although off Cape Horn the current is strong between it and Cape Pillar, it is by no means regular; sometimes, with a strong wind and flowing tide, it runs 2 knots or more, at others it is hardly worth notice. During the survey of this neighborhood by H. B. M. S. *Beagle*, the current was never found to set to the westward at any time of tide or with any wind. A strong current sets, at times, along the outer coast of the Hermite Islands and through St. Francis Bay, which divides Horn Island from the rest of the group, varying from ½ knot to 2 knots, according to the wind and tide; and in the bay changes its direction with the change of tide.

In the channel between False Cape Horn and the Hermite Islands a current is found setting into Nassau Bay, and rather toward the Hermite Islands, at a rate of 2 knots, with the flood tide, and about ½ knot with the ebb. As this current sets rather toward West Cape, a good berth must be given to it in passing.

# CHAPTER VII.

## MAGELLAN STRAIT AND THE WATERS NORTH OF IT.

### ASPECT OF THE SHORES.

While covering the comparatively short distance through the strait a very interesting change will be experienced, both in the aspect of the country and in the climate. From Cape Virgins to Cape Negro the land is comparatively low, covered with grass, but not a tree visible.

In clear weather, from the Second Narrows, the high mountains on Dawson Island and Mount San Felipe will be seen to the southward, forming an apparent barrier, blocking up the passage, and over the latter the summit of Mount Tarn stands out in bold relief. The view presented by these mountains from abreast Sandy Point is magnificent, and the spectator feels as if he were entering upon a totally new description of country from that passed in coming from Cape Virgins.

About Cape Negro wood commences and the land gradually becomes higher. The forest is denser and the mountains more lofty as Cape Froward is approached, and these characteristics continue as far as the eastern part of Long Reach. From this point, though mountains still border the strait, trees become smaller and smaller, until toward the western end of the strait the shores are absolutely bare and rocky, the ravines only showing a stunted though dense vegetation.

Eastward of Cape Froward the country is not only habitable, but comfortably so, while the comparatively level land is available for the pasturage of sheep and cattle, and for the cultivation of roots.

Westward of Cape Froward the land is a mass of abrupt mountains, mostly of granite or slate, bare on the upper parts, but covered either with thick moss or dense beech forest on the lower slopes. Peat mosses saturated with moisture fill all hollows, and it may be truly said not a square yard of useful land is to be found.

The scenery in the western portion of the Strait is grand and savage. The snow-capped peaks supply ice and snow for numerous glaciers, which descend nearly to the sea in some places, and frequently crown the precipices. Many waterfalls and cascades, some

of which are of great height, fall into the bays, furnishing scenery that rivals the fiords of Norway. It is unfortunate for the voyager in these parts that the weather is such as to render exceptional an opportunity to witness this grandeur of the best advantage.

### WEATHER.

The clearest months are from September to the end of December and the worst on account of the snow and heavy gales are from the middle of June to the middle of August.

The summer season is far preferable for making the passage through the strait in going either way. The strongest winds are experienced during the equinoctial months, though the heaviest gales do not occur at the equinoxes. Toward the middle of May the weather becomes colder, and the snow, which has been covering the summits of the hills, perhaps for some time, will be seen to advance down the slopes; it, however, varies very much.

Sometimes, in winter, snow will cover the ground to the water's edge between Dungeness and Cape Froward, thence the snow line will gradually rise until, near Cape Pillar, only the highest peaks will be covered.

The coldest weather is in June, July, and August. A mean of six years' observations gives June as the coldest month four times, July once, and August once. Even in these winter months, though there are occasional cold days, the general temperature at Punta Arenas for several years is about 36° F. December, January, and February are the warmest; the days are then long, and the sun, when out, has some power, the mean temperature for several years being 54°.

Eastward of Punta Arenas the weather on shore is very fine, though rather windy, during summer; the temperature is pleasant, the air bracing and healthy. Between Punta Arenas and Cape Froward the prevailing weather is clear and bright, with strong winds between northwest and southwest, heavy rain occurring only with the wind north of northwest, or the occasional easterly gale.

Westward of Cape Froward the weather is undeniably very bad, and it is probable that no portion of the globe frequented by man experiences, the whole year round, worse weather. Winter and summer alike, rain, snow, hail, and wind are absent only for very brief periods. The total rainfall is doubtless greater in some other places, but it is confined to certain seasons, whereas in these regions it is impartially distributed throughout the year, and there is absolutely no fine season. It should be noted, however, that in the western part of the strait rain is more likely to be experienced along the southern than along the northern shore.

The change in the weather on passing Cape Froward is generally very striking.

The remarks about the weather which deal with the outer regions of Tierra del Fuego apply very closely to what may be expected in the strait west of Cape Froward, but the narrowness of the channel and height of the mountains give local influence great force, and it is impossible to follow the regular changes in the direction of the wind, which Capt. King and Fitz-Roy speak of, in the open sea.

**Fogs** are of rare occurrence and of short duration in the eastern part of the strait, though sometimes they set in thick for a few hours without any warning during calm weather. There are instances of dense fogs lasting two or three days at Punta Arenas in the winter season. Thick, rainy weather is the ordinary condition of the weather in the western part.

**Squalls** blow with great force and suddenness all over the strait, making it unadvisable to set light sails, even when the weather seems most promising. No boat should be sent any distance from the vessel in any part of the strait without two or three days' provisions on board, and if in the eastern part, water and firewood.

Squalls are usually of short duration, and between the lulls or clearings either one shore or the other will generally be visible, giving the navigator a chance to check his position.

**Lightning and thunder** are very rare except in very bad weather, when violent squalls come from the south and southwest. These storms are rendered more formidable by snow and hail of a large size.

### WINDS.

Westerly winds are most prevalent throughout the year, and at the eastern end of the strait there is generally a strong breeze, with heavy squalls between northwest and southwest. A cloudy, overcast sky, and probably rain, while the wind is northward of west, but when the wind draws to the southward of west the weather usually becomes clear and bright. The general course of the wind seems to commence at northeast or north, with misty weather or rain, shifting quickly to northwest and freshening while the barometer falls. It frequently rains two or three days between north and west, the weather clearing when it inclines to west, and when it draws to the northward mist and rain increasing and the barometer falling; with this wind a decided rise in the barometer is a sure sign of a shift to southwest, which shift invariably takes place before the wind lulls for any time, or fine weather can be expected.

In summer the wind generally dies away from the southwest, but after uncertain durations from that quarter, and before the north

or northwest wind begins again an hour or so of light easterly or northeasterly wind will probably be experienced, showing that the wind has gone around the right way through the southeast quarter. As winter advances the southeast wind becomes more prevalent, and instead of dying away at southwest it will frequently vary between south-southwest and southeast for two or three days. Sometimes it continues around to east or northeast, still blowing hard, and with wet, gloomy weather, not preceded by the interval of fine weather experienced on the coast before a gale comes on from the southeast.

This shifting around is, however, like the easterly gales on the coast, of rare occurrence. As a rule the southwest wind is the stronger and the squalls heavier than from the northwest, and no certain warning is given of this shift. Sometimes the barometer precedes it, but more generally accompanies it. Frequently heavy banks of white cumulus clouds, with hard edges, and appearing very rounded and solid, will be seen rising from the southwest or southward, but this is oftener the case when a southwest wind is about to spring up from a calm or light air than as indicative of a gale shifting to southwest or south.

The shifting of the wind from southwest to northwest is generally, if not always, accompanied by a falling barometer or its ceasing to rise, as it does during the whole time it blows from southwest. The change of wind usually accompanies the change in the barometer, and the mercury merely ceasing to rise may indicate the subsidence of the southwest wind. If the wind shifts from north to northeast, the same bad weather may be expected that is mentioned as usual when it draws around from the southward to the east, and generally, when the wind veers, make preparations for bad weather, even though the barometer does not fall.

Northerly winds are often preceded by low-flying clouds, with a thickly overcast sky, in which the upper clouds appear at a great height. Sometimes, but very rarely, with a light wind between north-northeast and north-northwest, a few days of fine weather may occur; but this can not be predicted, as it occurs sometimes with a very high barometer, and at other times with a very low one.

### BAROMETER.

As regards the usefulness of the barometer readings in these waters, authorities differ, but the consensus of opinion is that the barometer is of little use in predicting changes of weather. More frequently the rise and fall accompanies the change. Sometimes the barometer will fall very low and yet the weather will continue fine, and again with a given height of barometer the weather may be either

good or bad. This is believed to be due to local areas of high and low pressure produced by the conformation of the land.

The normal height of the barometer in these regions seems to be below 29.80 inches.

### NATIVES.

Fuegians will rarely be met with eastward of Cape Froward, and generally are not seen east of English Reach.

The Patagonians have retired to the north, and the Onas Tribe of Fuegians who inhabit the main island of Tierra del Fuego are not canoe Indians and are, moveover, very shy of showing themselves to any strangers who may land, though they are by no means timid in the ordinary sense of the word.

The Yaghan Tribe of Indians, which inhabits the western part of Fuegia, is a feeble and backward lot of people, numbering some 200. They are almost devoid of weapons and are obliged to live close to the shore to obtain mussels, shellfish, etc., for food. They are generally almost naked, the women appearing to care less about clothing than the men, and either will sell you any seal skin they have for a little biscuit or tobacco. It is said that they soon die if obliged to wear clothes. The men are excellent and fearless sailors, but are said to be unable to swim; the women are good swimmers.

To the northwest, toward the entrance of the strait, as well as in the sounds and channels of the archipelago, the country is inhabited by the Alacalufs, a fishing and hunting tribe numbering about 800. The Alacalufs are said to be a sullen, crafty, and treacherous race, yet they have some sort of tribal organization and occasionally combine to attack shipwrecked crews. Their canoes are larger than those of the Yaghans, some being capable of carrying 25 or 30 people, but are of the crudest manufacture. See also Chapter VI.

### BUOYAGE.

The buoys in Magellan Strait are rather small, and during thick weather or when the wind is blowing hard it is often difficult to pick them up. It is very easy for a stranger to pass some of them unnoticed. Too much dependence should not be placed on them, as the strong currents and heavy gales are liable to drag them from their positions.

The terms herein used apply to all harbors and channels, including those in Magellan Strait, but in the main channel of that strait and in the Patagonian channels the terms port and starboard hand refer to a vessel passing through from the Atlantic to the Pacific.

The following uniform system of buoyage and beaconage has been established in Chilean waters:

Buoys or beacons marking the southern side of the strait or the port side of a channel, harbor, or river are cylindrical or square in shape and painted black; and if surmounted by a topmark, that also will be square or cylindrical and black.

Those marking the starboard side of a channel or northern side of the strait are conical or pyramidal in shape and painted red; and if surmounted by a topmark, that also will be conical or pyramidal and red.

Buoys or beacons marking middle grounds, which may be passed on either side, are spherical in shape and painted black and white in horizontal bands, with a similar topmark, if any.

Beacons marking rocks and those marking the coast, which it is not necessary to see at any distance, consist of posts surmounted by topmarks of the form and color to accord with the positions they occupy with respect to the channel or harbor in which they are placed. If located in exposed places, these beacons are frequently mounted on tripods. The shape and color of the leading beacons also correspond with their positions in a channel or harbor.

Wrecks are marked by a spherical or, in default of this, a cylindrical buoy, painted green, with or without a topmark. The word "Naufrajio" is painted on the body of the buoy.

Mooring buoys for quarantine are painted yellow and those for vessels carrying explosives red; but one buoy is frequently used for both purposes and painted red.

The name of the danger which the buoy marks is painted in large white letters on its side.

The form of the beacons and buoys is more important than the color, as the color of beacons may vary to suit the background against which they are seen. The shape of the topmarks is of greater importance than the shape of the beacons or buoys.

**Refuge stations.**—The beacons on Dungeness, Direction Hill, Baxa Point, and Sandy Point are so constructed as to serve as refuges for shipwrecked persons; they afford shelter, and are closed by sliding doors.

### SIGNALS.

The following are signals used on the coast of Chile by vessels requiring the services of a pilot or by vessels in distress requiring assistance:

PILOT—*By day.*—A flag with a white border, flying from the masthead, or the signal "PT" of the International Code.

*By night.*—Burning a blue light every quarter of an hour, or showing a white light at short intervals, such light being shown above the upper works for the space of one minute each time.

NOTE.—Any shipmaster permitting any of the above signals to be shown, such signal not being intended as a pilot signal, or who shall use other signals for this purpose, is liable to a penalty.

DISTRESS—*By day.*—A gun fired at intervals of one minute, or the signal "NC" of the International Code.

In imminent danger: A checkered flag with a ball or shape either above or below it should be shown.

*By night.*—A gun fired at intervals of one minute, or a flare or flashes shown at short intervals, or the firing of signal rockets.

NOTE.—Any shipmaster permitting any one of these signals to be made other than for the purpose of calling for assistance in distress is liable to pay indemnification for all trouble, risk, and loss sustained in sending such assistance.

### CHANNELS.

The water in the strait is deep; the shores well defined; the various points of land and aids to navigation, except in a few instances, mentioned elsewhere, are easily distinguished. The depth of water between Cape Virgin and Cape Negro rarely exceeds 30 or 40 fathoms; there are many shoals and banks; the tidal currents are very rapid, with a rise of water in the eastern part of 44 feet and in that of the western of not more than 7 feet; and with anchorage in almost all parts except in the Narrows.

South of Sandy Point the shores are for the most part steep-to and little tide exists. The depth of the water is considerable, and the principal difficulties in navigation are all but continuous, strong westerly winds accompanied by thick driving rain or snow and the scarcity of suitable anchorage at convenient distances for large steamers.

Bold rocky headlands jutting out into the strait are numerous, and their similarity, when seen in the distance, is in several instances particularly confusing and requires close attention to the detail of their outlines.

Small islands and rocks skirt both shore lines; and numerous submerged ledges, usually growing an abundance of kelp, are found all along both sides of the western part of the strait. The main channel, however, in Sea Reach and Long Reach is clear of these dangers. The swell from the Pacific will always be found rolling in as far as Tamar Island.

**Kelp.**—Wherever kelp is seen the bottom is generally sure to be more than usually uneven and foul, with no mud. Keep a good lookout for "fixed kelp," the weed which grows on every rock that is covered by the sea, and not very far below its surface. Lying upon the water, the upper leaves and stalks show almost as well as a buoy. Long stems with leaves lying regularly along the surface are usually

attached to rocky places or else to large stones. In passing to windward of patches or beds of kelp (that side from which the weed streams away with the current), give the place a wide berth, because the part which shows is not over the rocks, but to one side of them. Where the current is very strong, the kelp is quite run under and kept down out of sight, and can no longer be depended on as a warning. When a clear spot is seen in the middle of a thick bed of kelp, one may be sure to find there the least water. "Drift kelp," or that which is floating, may generally be known by its irregular, huddled look. Parallel ridges of kelp have usually deep water between them.

### TIDES AND TIDAL STREAMS.

The direction in which the tidal stream is setting is of the greatest importance when navigating the eastern part of Magellan Strait. Before entering upon the direction and strength of the stream, it is well to state that, with very slight local variations in harbors, there are two regular tides in the 24 hours.

The charts show the strength of the stream at ordinary springs and its direction at the different anchorages, and the seaman must make the same allowance for it as he would in any other tideway.

In passing through the strait from the eastward, it should always be borne in mind that the time of high and low water gets later as the undulation proceeds westward, until Royal Road is reached; and the consequence is that the west-going stream changes later, a circumstance which considerably facilitates the navigation from east to west, and makes it easy for a vessel starting from Possession Bay, or even Dungeness, in time to catch the first of the west-going stream in the First Narrows to get to Royal Road or Punta Arenas in a day, unless the wind is strong against her. This refers to nine months of the year.

During the depth of winter (June, July, and August), when there is little more than eight hours' daylight, this would be difficult without weighing, and very likely coming to, in the dark. The seaman acquainted with the navigation need not, however, hesitate to do this.

From Punta Arenas to the eastern entrance of the strait the tide sets east and west with equal strength and in equal time. The western or flood stream continues to flow in the channel abreast any particular point on shore for three hours after high water at such point, and also the east-going or ebb flows for three hours after low water; that is, the west-going stream begins three hours before high water and continues running until three hours after high water. There are some exceptions to this rule, as in Lomas and Gregory Bays, close round St. Catherine Point, and at Spiteful Anchorage.

The wind in the wide part outside and between the Narrows seems also to have some influence, especially at neap tides, but for practical purposes three hours may be taken.

To the northward of Cape Virgins the streams set northwest and southeast along the coast; the same will be found on the outer edge and outside Sarmiento Bank. The flood stream sweeps up the eastern shore of Tierra del Fuego until it reaches the southern end of Sarmiento Bank, where it divides, one part continuing on up the coast and the other entering the strait. In the same way the stream of the ebb in coming out of the strait is met and turned to the southward by the tidal stream sweeping down the coast and across the entrance in the same direction. The navigator must not be deceived by this, for it makes the stream of the flood on the north end of the bank appear to run out of the strait, while toward the south end it varies with the time of the tide.

Although the time of high water full and change is about 8h. 30m. at this eastern entrance to the strait, the flood stream continues to run in the channel until near noon; and although the time of low water is about 2h. 30m., the ebb stream continues to run until about 6 o'clock.

Therefore a navigator bucking a flood tide just inside Dungeness may expect a northerly set over Sarmiento Bank, and due to the fact that the strong current over this bank carries sand in suspension will find that the water is at times discolored to the north and east until 30 or 40 fathoms is reached.

Thus it is easy to deduce the best time for entering the strait, or quitting Dungeness or Possession Bay, the object being to get well up toward the Narrows on the last of the east-going stream, so as to get the full force of the west-going stream through the Narrows as soon as it makes; for there, as has been said, the wind, if from the westward, will very likely freshen. Care must be taken, however, to ascertain the vessel's position constantly, as the east-going stream sets toward Orange Bank, as it is approached. A full-powered vessel will have no difficulty in stemming the stream only, either east or west of the Narrows, though in strong westerly winds even such a vessel had better await the turn at Dungeness, as far as which the east-going stream through the strait will be the fair tide in coming from the northward. A vessel with moderate steam power must, of course, be guided by circumstances. Through both Narrows the stream runs straight, but at each entrance the volume of water which has been pent up between such narrow walls naturally seeks to spread itself out, and consequently causes a strong set toward the banks on either side of the end toward which the stream is running, and a corresponding indraft at the other end. Thus, a vessel, on opening either Narrows, will find herself set in to the

northward or southward, according as she has come along the north or south side of the Narrows. If two vessels go westward, one along the north and the other the south side of the First Narrows, as they come to Baxa and Barranca Points, one will find herself set on to the Satellite Patch, and the other on to the shoal off Baxa Point.

This is, of course, felt much more in the First Narrows, where the stream runs from 5 to 8 knots during springs with no slack water, than in the Second Narrows, where the stream runs from 3 to 6 knots during springs. The navigator must not be alarmed by the strong tide rips, which will be seen in many places where no danger exists, especially at the west end of the First Narrows, off Cape St. Vincent, in Lee Bay, between Elizabeth and Magdalena Islands, and on both sides of Walker Shoal. Though this affects the surface of the water and a vessel upon it, the mass of water seems to keep the main channel well scoured out, makes the outer edges of the banks or those on the sides of the channel steep-to, and seems to indicate that, though the precise depth of water on the shoalest parts of the banks may vary, the general position and direction of the banks will not. This does not refer to deep harbors or bays where eddies may exist or spits be formed by rivers.

With a western current between Cape St. Vincent and Sylvester Point there is a set to the southeastward over New Bank, and with an eastern current between the points the set is strong to the northwesward over Marta Bank.

The tidal currents between Crooked Reach and Punta Arenas offer no particular difficulties to the mariner.

The northern shore eastward of Passage Point, English Reach, being clear of outlying dangers, gives a vessel meeting a head tide an opportunity to haul inshore out of the strength of the current.

At York Bay in Crooked Reach, just eastward of Jerome Channel, it is high water full and change at two hours, while at Borja Bay, northwestward of Cape Crosstide, also in Crooked Reach, it is high water at 1 hour and 15 minutes. The ebb stream westward from Borja Bay begins directly after high water and is accelerated by the Atlantic tide, which continues to flow three hours after high water. (The east-going or ebb also flows three hours after low water, as in the eastern part of the strait.) The great volume of the Atlantic tide, however, is diverted over the large expanse of Otway and Sykring Bays.

At Cape Pillar it is high water full and change regularly at one hour, yet there is no change of current, it is always setting eastward. Within the strait the currents are only of a tidal nature, although considerably influenced by the prevailing westerly winds. They follow the direction of the channel, except at the entrances to bays and other cross channels, where the main stream is influenced by the in-

flow. For example, the northerly set is at times very strong into Smyth Channel and Beaufort Bay, just westward of Tamar Island in Sea Reach, and should be carefully guarded against.

In Sea Reach and Long Reach the east-going or flood stream prevails at all times, but varies in velocity. The effect of the west or ebb stream is inconsequent in Sea Reach, but becomes noticeable in Long Reach, and is of considerable importance in Crooked Reach, where the tidal currents are dangerous and attain a strength of 3½ knots. Off Cape Crosstide, in Crooked Reach, the Pacific tide meets the Atlantic tide and causes rips and overfalls.

As soon as the ripple north of Cape Pillar is passed the southerly set is of comparatively little importance and the prevailing set then becomes southeastward, its strength being governed by the wind and stage of the tide.

A southward set attaining at times 1 knot an hour is found off the coast of Chile from the vicinity of Western Rock southward. This current is especially noticeable when the winds are from the northwest quadrant. It runs through the shoals and islands inside Los Evangelistas and sets athwart the course after a steamer has headed for the entrance to the strait.

The following is a quotation from Lecky's Wrinkles in Practical Navigation:

Though not an inland sea in the strict sense of the term, Magellan Strait nevertheless partakes sufficiently of the characteristics of one. Now, it so happens that in the gourd-shaped arm of the sea adjoining the contracted cliffy channel forming the water communication between the straits and the South Atlantic there is a rise and fall of 42 feet. This great tidal range is due to its shape, combined with the fact that it opens invitingly to the direct course of the tide wave flowing in from the southeastward. But in the basin immediately within the Narrows the range is only 22 feet and farther on it is much less, for when a large water area has to be filled through a contracted opening, as in the present case, the inner tide suffers a gradual degradation as the water composing it spreads itself and finally becomes nearly insensible. Therefore, it is that after passing what is known as the Second Narrows the Magellan tide virtually becomes spent and the rise and fall insignificant. Indeed, the latter would be even less were it not for the numerous water passages communicating with the Pacific Ocean, which act as feeders.

What has been here described as occurring inside the Narrows is just the reverse of what takes place outside the Narrows. In the latter case the tidal range is continually augmented as it proceeds up the estuary, till at or near the head it reaches its maximum.

* * * * * * *

We will begin by supposing it high water outside the narrows. * * * The water will then commence to fall, but from its level being 21 feet higher than inside the flood stream will continue to run in through the Narrows till both basin and estuary have arrived at the same level, which will not happen, however, for three hours, by which time it will be half ebb. The ocean water which has passed through the Narrows can not, however, do much to swell the inner tide, since its volume is but trifling as compared with the large area over which it has to spread itself. At three hours after high water, the surface level

being then the same both inside and out, there is a momentary stand in the current which up till now has been flowing in. But as soon as the outside level drops sufficiently to cause an incline in the other direction the stream will commence to rush out and continue to do so till the common level is again restored, which will not be before half flood. As may well be imagined, the tide in the Narrows seethes like a boiling pot and makes steady steering an impossibility.

## ANCHORAGES.[1]

The greater tonnage and increased length of deep-water steamers render several anchorages, heretofore considered good, unserviceable, as there is not sufficient room for large vessels to swing; but there are, nevertheless, two or three good anchorages for large vessels between the western entrance and Cape Froward, which ordinarily can be reached if the ship's run is properly timed.

From the reaches, especially those in the western portion of the strait, numerous large arms of the sea or fiords cut deeply into the land; these vary greatly in size, and there are a succession of them on both sides of the strait; many, however, are difficult of access, and in those whose sides are precipitous the water is so deep that they are of little value as anchorages. Even when a convenient depth is found the "williwaws" are often so violent and so erratic in direction that the location becomes very undesirable as an anchorage.

Anchorages may appear perfectly landlocked, and with the wind from many points a vessel will lie quiet in them while the squalls pass overhead. Each harbor, however, has some point as a gully or a cliff from which the wind is deflected, and the same harbor which one navigator may report as having afforded him perfect shelter in a gale another may find extremely uncomfortable and even dangerous with the wind from a slightly different direction. It requires considerable experience before a trustworthy opinion of the value of an anchorage can be formed; it must be occupied with strong winds from all points.

The more open anchorages, and apparently the least protected to windward, often prove the best as far as squalls are concerned.

The best anchorages are Port Churruca, Field Anchorage, Borja Bay, and Fortescue Bay.

As a rule the anchorage space in the western portion of Magellan Strait is limited and the bottom is either rocky and very uneven or else consists of small stones and gravel; the former condition prevails. Anchors should always be placed in the deepest water in the anchorages, as mud is usually found there, and it is always advisable to lower the anchor rather than to let it go by the run. Over such an uneven bottom it is difficult to pick a good berth,

[1] See Table of Anchorages.

but whenever possible avoid having a ridge between the anchor and the vessel, for then surging will be a maximum. When "williwaws" begin pay out plenty of cable if the harbor admits; heavy "williwaws" cause a vessel to sheer a great deal, bringing severe strains on the cable and anchor which often cause accidents to the ground tackle.

The late Capt. Morrison said:

All the anchorages west of Borja Bay are too confined for large steamers, but Field Anchorage, where the holding ground is excellent, is probably the best. A vessel 400 to 450 feet long anchored in the mud hole abreast of Hat Island in 12 fathoms of water and 85 fathoms of chain will barely swing clear. At Port Churruca there is a little more room, but the bottom is rocky and the anchor should be eased down. In Nassau Anchorage there are no hidden dangers, except close to Holland Point. Oldfield anchorage is too small for large vessels.

In Field Anchorage an old cable, probably attached to an anchor, lies on the bottom 100 yards 250° from the anchor marked on the chart. This chain has been fouled and has given trouble on several occasions.

The navigator approaching Magellan Strait from the westward should time the arrival of his vessel off Cape Pillar in such a way as to reach a suitable anchorage during daylight. In estimating the run it should be remembered that, although there is no head tide to retard the progress until Crooked Reach is approached, frequent and heavy squalls will often make it necessary to slow down from time to time.

If a master arrives at the entrance to the strait in the late afternoon with a large steamer, it is wiser to lie off and on than to attempt to make any of the contracted anchorages in the western part of the strait. In this unenviable position Felix Point Light, about 27 miles inside Cape Pillar, will be found of great value. An opportunity is usually given to get an occasional bearing of it between squalls.

Field Anchorage can easily be made in a day's run with a full-powered steamer in the wintertime. In the summer season Fortescue Bay may be made in such a vessel, but the progress in all cases depends on the weather. This latter anchorage is the first wherein the presence of several large vessels would not prove embarrassing, and should be sought by large steamers desiring to anchor.

These two anchorages have been particularly mentioned as the best anchorages for large steamers westward of Cape Froward; eastward of Cape Froward there is no difficulty in finding safe and convenient anchorage every few miles.

If obliged for any reason to anchor anywhere eastward of the First Narrows it should not be forgotten that there is a range of tide varying from 36 to 42 feet.

### GENERAL REMARKS ON THE PASSAGE.

The distance through the strait, following the various channels, from Cape Virgins to Cape Pillar, is about 310 miles. It is 160 miles between Cape Froward and the eastern entrance, and 150 miles between Cape Froward and the western entrance. The passage is safe for steamers, but vigilance and caution are necessary.

At no season of the year is it advisable for a square-rigged vessel of any size to attempt the passage from east to west with sail only, even should she be so fortunate as to make the strait and pass through both Narrows with an easterly wind, for it is highly improbable that it would last through the whole strait, and she would certainly find herself beating through channels varying in width from 10 to 2 miles, in thick, wet weather, with furious williwaws, so variable in their direction as to prevent making a single straight course, and with most of the harbors very difficult both of ingress and egress.

During the summer months, from November to May, a sailing vessel might pass through from west to east with almost the certainty of a fair wind all the way, though nothing but smooth water would be gained by it.

For a vessel with full or auxiliary steam power the difficulties and dangers in navigating the strait either way are the same that are experienced in narrow channels and close harbors of the same latitude elsewhere.

But if the weather is thick, as is likely to be the case for more or less protracted periods, the navigation of Magellan Strait is both difficult and dangerous, because of incomplete surveys, the lack of aids to navigation, the great distance between anchorages, the lack of good anchorages, the strong currents, and the narrow limits for maneuvering ship. Hydrographic Office charts carry the following caution which navigators should bear in mind at all times:

> As there has been no complete survey of Magellan Strait, the navigator is cautioned that, although this chart may be considered a sufficient guide by daylight, he must not too implicitly trust in it during thick weather; as, in some few instances, the bearings from headland to headland are not strictly accurate.

During the summer months a vessel with moderate steam power should not, under ordinary circumstances, be more than five days making the distance through the Strait, even if compelled to anchor every night.

The difference in the duration of daylight in summer and winter naturally forms an important consideration in this navigation. The time of full moon is the best for making the Strait, as the tide serves at that time for passing the Narrows.

DIRECTIONS—FORE-AND-AFT RIGGED SAILING VESSELS.

**Dungeness to Punta Arenas.**—Small, handy fore-and-aft rigged sailing vessels; e. g., the Gloucester fishing schooners during the Klondike rush, have succeeded in making the passage of the strait from Dungeness to the Pacific entrance, but it is a feat rarely attempted. Square-rigged vessels would find it extremely hazardous to attempt the passage of the strait even as far as Punta Arenas; fore-and-afters may, however, go that far, and the following directions are for their benefit.

Working up from Dungeness, beat along the north shore with westerly or northwesterly winds. By keeping on the north side until well to the westward of Cape Possession, the wind will be a leading one for the First Narrows; and if it should shift to the southwest, Schooner Anchorage, at the northern entrance to the First Narrows, will be close at hand, where a vessel will be quite safe and out of the strength of the tide. With a southwest wind stand well over to Lomas Bank, and then with a rising tide a good stretch can be made to Plumper Anchorage, or, if to windward of that place, another tack will fetch Schooner Anchorage. Vessels anchoring here should exercise great caution, as the remains of a wreck, not marked, lies in this anchorage and its position shifts with the currents.

The first slant of wind, or calm with the tide, should be taken advantage of to clear the Narrows, after which the passage is comparatively easy. Between the Narrows, Satellite Patch, Tribune Bank, and Triton Bank are the only dangers which would bring a small vessel up, and for this it is only necessary to take care not to bring Gregory Shoulder to bear southward of 279°, or the summit of Cape Gregory southward of 268°, when in the neighborhood, or while Gap Peak, if visible, bears between 150° and 155°.

In the Second Narrows, when standing to the northward, do not pass inside a line joining Cape Gregory and Gracia Point. and with a southwest wind and flood tide Cape St. Vincent should not be passed within 2 miles, although it is intended to pass through New Channel.

To pass through Queen Channel a good stretch must be made into Royal Road until the northeast point of Elizabeth Island bears about 200°, when stand round it.

With a light or failing wind, it is absolutely necessary to keep over toward the north shore of the Second Narrows as the western end is neared, and rather anchor in Royal Road, or even in the edge of the bank off Gracia Point, than try to pass Santa Marta Island without a commanding breeze.

After passing the north end of Elizabeth Island, Santa Marta should not be opened to the northward of Cape St. Vincent until past Hawk Cliff. An anchor may be dropped in the bight between Sylvester Point and Hawk Cliff to hold position. If bound to Laredo Bay, Cape Negro should be rounded as close as prudence admits.

**Punta Arenas eastward.**—From Punta Arenas a vessel should keep well out before hauling along the coast to avoid the shoal water of the spit, and if intending to anchor in Laredo Bay, a good berth should be given its southern point. Bear in mind that the change in the time of tide and turn of stream, which assists the westbound ship, acts against one eastbound, though in some measure compensated for by the prevalence of westerly winds. It will sometimes be found advantageous to leave Punta Arenas in the afternoon or evening and anchor for the night in Laredo Bay, so as to be ready to take advantage of the first of the east-going stream in the morning. This will, of course, depend on the age of the moon. At Elizabeth Island it is high water, full and change, soon after 9h. 30m. a. m., and consequently the east-going stream would not commence running until 0h. 30m. During the summer months it is daylight between 2h. and 3h. a. m., and therefore a vessel leaving Laredo Bay at daylight would have plenty of time to get to Gregory Bay, or farther with a fair wind, before the turn of the tide at 6h. a. m., as there is little difference of time between Elizabeth Island and Gregory Bay. She can then anchor during the west-going stream, and, weighing with the commencement of the east-going stream, which will begin to run at noon on the same day in the First Narrows, will get to Dungeness or out to sea that night. Even in the short days much may be done by a judicious consideration of these all-important tides, but the seaman must be guided by the age of the moon when on the spot. With a strong, fair wind, a vessel may, to a certain extent, defy the tides, but it is always better, if possible, to take advantage of them. After leaving Laredo Bay and proceeding by Queen Channel, give Cape Porpesse a wide berth, and do not bring Cape Thorax to bear westward of 301° until Alfred Point bears 28°, when steer for the point on that bearing. When the south extreme of Santa Magdalena Island bears 107° Cape St. Vincent should be seen just open east of Santa Marta Island; keep these marks on until the south extreme of Santa Magdalena Island bears 141°, when alter course to pass 800 yards east of Sylvester Point, whence steer for Gracia Point, edging away for the narrows as Marta Bank is passed and Cape St. Vincent bears 79°.

Then steer for the narrows; a course about 59° leads through. When abreast of Cape Gregory, a vessel intending to anchor in Gregory or St. Jago Bays, should steer northward, and when the north

extremity of the sandy land of the cape is in line with the western extremity of the high table-land (Gregory Shoulder) the vessel will be near the anchorage, but the Hummock should be well open to the northward of the cape, over the grassy valley, before anchoring. From this position Valle Point and the hillocks near it will be distinctly visible, and the vessel can be kept for the anchorage under it or edged away to pass northward of the banks.

A vessel, however, bound direct for the First Narrows, from 1½ miles south of Cape Gregory, should steer 76°, which will lead southward of Tribune and Triton Banks. Advancing eastward, Mount Sutlej and Dixon Hill will be the first land seen, and in clear weather Mount Aymond will also appear a little to the eastward of the former. The land forming the entrance of the Narrows, being low, will not be perceived until some time after seeing Dixon Hill and others on the Fuegian side, which appear as islands; but as it is closed, the summit of Barranca Point and Nuñez Head on the north side and Mendez Point on the south will be seen.

When Mount Sutlej bears 357°, or Barranca Cliff 20°, and Dixon Hill 90°, the ship will be in mid-channel 4⅓ miles from Barranca Point, and thence a 45° course will lead straight through the First Narrows. Care must be taken to keep in mid-channel till Barranca Point bears 301°, as the ebb stream sets rather toward Satellite Patch, if a vessel gets to the westward. Nunez Head shows as a triangular cliff and is a good mark. As Nuñez Head is approached Direction Hill and the peak of Cape Orange will appear, and when abreast of them Cape Possession will be seen as an island on the starboard bow.

When Direction Hill bears 301° and Cape Orange 175°, Mount Aymond, if visible, bearing 346°, steer 69° for Cape Possession for 9½ miles, until Mount Aymond bears 312°, when a 99° course clears the strait. Should it be intended to anchor in Possession Bay, a 48° course may be steered from the Narrows, until Mount Aymond bears 312°, when steer into the bay, keeping Daniel Point open of Cape Possession until the moment of doing so. The same regard must be had to the tides in crossing Sarmiento Bank as when entering the strait.

### DIRECTIONS—STEAM VESSELS—WESTWARD.

**Eastern entrance to Froward Reach.**—Before entering the strait the tides should be carefully considered. An anchor might be dropped, if necessary, to wait for the tide on Sarmiento Bank, but it is quite exposed and the holding ground indifferent. It would, if possible, be much better to get under Dungeness Spit. The best route to the strait is over Sarmiento Bank, which can be safely

crossed between half flood and half ebb, but care must be taken to keep 1½ miles off Cape Virgins to avoid Virgin Reef, and not more than 2½ miles off, unless it be intended to pass southward of Nassau Rock. Many masters familiar with this locality pass close to Nassau Rock in crossing Sarmiento Bank, but, owing to disasters reported off Cape Virgins, a wider berth is recommended as a safer course. At low water a large vessel should not cross within 10 miles of Cape Virgins, beyond which distance the soundings will be more regular than farther north.

A vessel bound westward should quit either of the above anchorages as soon as possible after the strength of the southwest wind is over and reach Possession Bay, Spiteful, or Plumper Anchorages. This may be effected by a steamer of ordinary speed against the tide, for westerly winds will generally be found to freshen as the west-going stream commences. Westerly winds usually fall considerably about sunset, and by being ready to take advantage of this a vessel may frequently get through the First Narrows before dark. In the event of fog or thick, rainy weather, or, if necessary to wait the change of the stream before entering the First Narrows, an anchor may be dropped anywhere between Dungeness and Possession Bay, taking care to keep clear of the shoals.

From a position about 1 mile south of Dungeness a course should be shaped about 279° for 30 miles, making due allowance for tidal influences, to lead about 2 miles clear of a detached 2-fathom patch, the northernmost of the dangers off Great Orange Bank; and when Cape Orange bears 149°, or Mount Aymond 320°, the course may be altered to 234°, which will lead about midway between that part of Great Orange Bank off Anegada Point and Direction Bank on the western shore.

In the above route from off Dungeness a 273° bearing of Direction Hill will insure keeping clear of Great Orange Bank, and Mount Sutlej open south of Direction Hill 265° leads a little over 1 mile south of Narrow Bank; but it is to be remembered that in a region of such intricate navigation and strong tidal streams increased caution is necessary, and frequently determining a vessel's position becomes an absolute necessity.

Delgada Point and Direction Hill in line bearing 15°, also Mount Aymond and Direction Hill in line bearing 3°, will be good marks for checking the position in running through the First Narrows. Nuñez Head will be recognized as a triangular cliff 95 feet high.

Both shores of the First Narrows are steep-to, but it is better to keep on the north side, as Anegada Point dries a long way out. From a position midway between Nuñez Head and Mendez Point, a 217° course should be steered for 10 miles; then, with Dixon Hill

astern on a 76° bearing, steer 256°, which will lead to the southward of both Triton and Tribune Banks and up to the Second Narrows. If it be blowing strong from the northwest, or if intending to anchor in Gregory Bay, 262° will be the better course. The lighthouse on the Cone on the north side of the Second Narrows bearing 268°, and well open south of Cape Gregory, leads south of Tribune Bank.

It is assumed that the southern passage between the Narrows is taken. The northern passage should never be used unless when seeking anchorage before reaching Gregory Bay, or when coming from the westward and desirous of anchoring as near the First Narrows as possible.

It may be remarked that a vessel having got into the First Narrows on the last of a fair tide, must not be deceived in the strength of the opposing stream by being able to make good way. With ordinary power she may easily steam against the tide by keeping close inshore while actually in the Narrows, and it is not till she gets into the entrance and almost through that she will meet with the full force, which requires a very powerful vessel to stem at springs, unless aided by a fair wind.

Proceeding through the Second Narrows after having passed Halfway Shoal, when the Cone light will bear 357°, a vessel should incline to the north shore to avoid being swept into Lee Bay by the west-going stream, or to get out of the strength of the east-going stream, both of which make with great strength off Cape St. Vincent. A vessel navigating the south side with a fair tide should steer from San Isidro Point to Gracia Point, easing away gradually for Elizabeth Island, as she passes Sweepstakes Foreland, and when Cape St. Vincent bears 200°, a course may be steered either for Queen Channel, the passage through Royal Road, or New Channel, eastward of Santa Marta and Santa Magdalena Islands.

Large vessels should use either Queen Channel or New Channel. With the present aids to navigation, New Channel presents fewer difficulties than Queen Channel and is now generally used.

In the channel through Royal Road and Pelican Passage there are several shoals. Its only use is for a vessel intending to anchor in Royal Road and wishing to get as far on as possible before anchoring, so as not to lose ground in the morning. Vessels drawing over 18 feet should not attempt the passage through Royal Road.

If bound through New Channel, from a position midway between Cape St. Vincent and Gracia Point, a 177° course leads straight through New Channel, which in no part is less than 3 miles wide. Bear in mind that Cape St. Vincent in line with the Cone bearing 12° leads to the westward of New Bank and east of the shoal ground off Santa Magdalena Island. The objections to this passage are the

tides, which for 2 or 3 miles southward of Cape St. Vincent run east and west directly across the course, rendering a vessel liable to be set either on to New Bank or the shoal already mentioned as extending from Santa Marta Island. The strength of the stream here is also much greater than would be expected from the expanse of water, and reaches fully 6 knots at springs, even when not aided by the wind. At Cape St. Vincent, with an ebb tide (east-going stream), a strong current sets across the channel to the northwestward. When the buoy on the northern end of Marta Bank is abeam a vessel should keep a little over to the eastward toward Quartermaster Island until the buoy off Santa Magdalena Island is picked up, when the way into Broad Reach is clear.

As a vessel proceeds, the west-going stream inclines more and more southward till when approaching the foul ground, which is marked by kelp off Santa Magdalena Island, it will be found setting southwest or toward the danger. Though Santa Marta and Santa Magdalena Islands and the hills on Elizabeth Island will generally be visible, yet it may be difficult to determine the ship's position in thick weather. The dangers on the outer edge of the bank off Santa Marta and Santa Magdalena Islands render it inadvisable for a vessel of any size to pass between the islands, or between them and Walker Shoal.

If intending to pass through Queen Channel, from a mid-channel position in the western part of the Second Narrows, with Cape St. Vincent bearing 200°, steer for the northwestern extremity of Elizabeth Island, which shows as a bluff, observing that Sylvester Point (a low shingle point), the northeastern extremity of the island, in line with Alfred Point bearing 214°, leads westward of the 2-fathom patch lying 37°, distant 2¼ miles fron Santa Marta Island, and when the eastern extremity of Santa Marta Island is in line with the western extremity of Santa Magdalena Island bearing 183°, steer 205°, passing Sylvester Point at ¼ mile distant, until Cape St. Vincent is just open east of Santa Marta Island bearing 48°. Keep the latter mark on astern until the southern extremity of Santa Magdalena Island bears 105°, when alter course to 216°, taking care to keep Sylvester Point well open of Alfred Point, until Cape Porpesse bears 318°, when all dangers will be passed, and a course can be shaped for Punta Arenas. The streams set up and down this channel, and, with land so close, thick weather need not impede the progress of a ship; the only possible danger is that of keeping away for the north end of Elizabeth Island too soon, by which a vessel is likely to be set on the shoal extending northward from Santa Marta Island.

After passing through either of the above channels, the western shores of Broad and Famine Reaches should be kept aboard. From

abreast Sandy Point a 183° course will lead down clear of Georgia Reef until Cape San Isidro is seen, east of St. Anna Point, when a vessel may steer along the land at a convenient distance to Cape Froward. San Isidro Light is obscured westward of 198° and thus serves as a guide to clear Georgia Reef.

As a rule, between Sandy Point and Cape San Isidro the wind will be off the land, more or less abeam, often in heavy squalls but with clear sky. As the latter is approached and the vessel gets under the high land that commences at Mount Tarn a zone of calm will often be passed through.

As Cape Froward is approached, sooner or later, according as the wind is far to the south or not, strong winds will be met which nearly always blow down Froward Reach, and from there onward head winds must be expected generally right down the line of reach, sometimes far enough to the south to set fore and aft sails.

**Caution.**—It has been found that the compasses of vessels laden with iron cargoes were affected while passing through Froward Reach; as the compasses of vessels otherwise laden might also be affected precautions should be taken against confusion.

At Cape Froward the squalls are exceptionally heavy; the seaman will frequently find a change of weather to heavy rain or snow, and may expect that the shores will often be invisible.

It is seldom, however, that there are not occasional clearings which enable the navigator to fix his position.

**Froward Reach to western entrance.**—From Cape Froward westward through the strait there is no necessity to wait for the turn of the tidal stream, although there are places, as Crooked Reach, where the current will materially affect the speed of a vessel.

All the coast from Cape San Isidro onward on the mainland side as far as Crooked Reach is steep-to and should be kept aboard with an easterly tidal current by low-powered vessels, as there is an eddy current well inshore while east of Cape Holland. From Cape Gallant keep in mid-stream as far as Cape Crosstide, which must be kept aboard to avoid Anson Rock, but exercise great care hereabouts on account of the strong eddies. It is in this part of the channel that the tidal currents are strong, especially the ebb stream, which reaches a velocity of 3½ knots an hour.

The tides meet at Cape Crosstide. East of this cape the currents obey the same law as in the eastern part of the strait, but west of the cape and throughout Long Reach the streams turn about the time of high and low water. Consequently, an hour before high water, say, the streams are meeting one another, while an hour after high water the tide is running up through York Roads into Jerome Channel on the east side at the same time that from St. Jerome Point is ebbing away to the west of Borja Bay.

For three hours after low water the flood coming from the west will add its force to the ebb stream turning out of Jerome Channel and down English Reach.

Anson Rock can be cleared by keeping the notch on Cape Quod open south of Big Borja Island, and Crooked Rock by keeping over toward El Morrion until Beware Island opens off Cape Quod, after which take mid-channel.

**Aids to navigation.**—Between Cape Froward and Cape Quod are the following aids to navigation: A beacon on Southwest Point, Fortescue Bay; a light tower on Rupert Island; a light tower on Cohorn Island, York Roads; a buoy on Anson Rock; a buoy on Crooked Rock; and a light tower on El Morrion, south shore of Crooked Reach.

Up Long Reach steer a mid-channel course. The easterly current seldom runs more than 1½ knots up to the vicinity of Cape Cooper Key, where it is stronger on the flood. There is generally an easterly set in this part of the strait, due to the wind.

If clear, Tamar Island will be visible; abreast of Arathoon Bay it will appear as an island with two peaks. Steering a mid-channel course, Cape Providence will open when passing Shelter Island; Conway Knob on Cordova Island and Cape Upright on the south shore will appear around Cape Monday when off Canoe Inlet.

After passing Shelter Island a lee may often be had as far as Cape Cooper Key by keeping on the north shore, where it is quite free from dangers. From the last-named cape up to Cape Monday the same will be found by keeping on the south shore, there being no dangers on that side 300 yards from the outer points and islets.

After passing Cape Monday, Sentinel Island Light should be seen on the port bow; pass it between 1½ and 2 miles off, and head up Sea Reach on a course about 300°. Southwestward of Tamar Island is foul ground, the shoals extending 1½ miles from the island, with shoal patches reported clear across to Wodsworth Bay. Keep about mid-channel and navigate with caution; the light on the little island east of Felix Bay (Felix Point Light) will aid in fixing the position.

From this point shape a course to pass Cape Pillar not more than 4 miles abeam, and round Los Evangelistas at a distance of 3 miles. Cape Pillar appears as a double nipple when seen from the eastward.

After passing Cape Pillar, if dark, the light on Los Evangelistas will soon show up. The coast north to Coronel, where steamers call for coal, should be followed about 40 miles distant.

**A head sea** will often be met about Cape Monday, and there it ought to be decided whether there is time to reach Port Tamar in case it gets worse, as there is no way of getting out of it, except by turning into the Cripples and Sylvia Channels.

A small vessel will often find this the best plan, though if she can make good headway in the main strait it will be better, of course, to remain in it. These channels, though narrow in parts, present no difficulty, as a mid-channel course is easy to keep. The only dangers are the rocky patches between Providence Island and the Tamar Peninsula in very thick weather.

To pass through Cripples Channel, edge around the west end of Santa Anna Island and steer 337°.

Richardson Island will be soon made out, standing out from the land and showing under the north end of Providence Island, and as the ship comes up to it the shore of Muños Gamera Peninsula must be closed about Thomas Bay until Webb Point is in line with the north hill of Richardson Island, which leads clear of the kelp patches on the port hand. When abreast of the first islets south of Richardson Island keep mid-channel.

As Cummins Point is passed haul up 348° for the channel between Vince and Pike Islands. The sharp Passage Island will be seen through this channel.

The west point of Vince Island passed, steer 11° to leave Entrance Island on the port hand.

If intending to keep the main strait, but induced to give it up on arrival off Cape Providence, course can be made for Sylvia Channel, north of the Maze Islands.

Brown Point, in line with York Hill, will lead east of Providence Bank until Cape Providence bears 292°, when course can be altered as requisite to round Brown Point, and so on to Sylvia Channel.

Sylvia Channel requires no special directions; a mid-channel course is easily kept.

**Caution.**—In view of the fact that westerly and southwesterly gales come on suddenly off the western entrance to the strait, masters of all except full-powered steamers should time their arrival at Cape Pillar so as to get a good offing in the daylaght. It is impossible to run back and attempt to pick up an anchorage during a dark night.

**Directions, eastward.**—See page 286.

### EASTERN ENTRANCE TO FIRST NARROWS—NORTH SHORE.

**Caution.**—The eastern entrance to Magellan Strait should be approached with great care. The velocity of the tidal streams, the variability of their direction off Cape Virgins, and the absence of good marks to fix the ship's position make the determination of position and the steering along an intended track very uncertain. Several reports have been made of vessels striking outside the limits of the dangers charted eastward of Cape Virgins, but there is no evidence

to show where they struck, and as the accidents occurred at night and no bearings are given, it seems probable that they all touched on the shoals extending from Cape Virgins.

**Landmarks.**—The hills on the south shore are not well defined, with the exception of Cape Orange and those in its immediate vicinity, the others visible from the channel being 10 miles inland, and not as they appear, near the water. From the southern side of the channel, also, it is difficult to distinguish the good marks on the north shore, such as Cape Possession, Direction Hills, or Mounts Dinero and Aymond, which are useful for obtaining a vessel's position when in the fairway or on the northern side of it.

**Sarmiento Bank** does not extend nor change, the general outline of its outer edge being kept in that position, following the general line of the coast from the northward, by the rapid current which sweeps along it. The ridge of the bank is shingle, while inside of it is coarse sand and gravel mixed. As a rule the shoaler the water the coarser the bottom. Coming from the eastward, or in a large vessel, it will be better to cross this bank well to the southward of Nassau Rock, and the time of tide between half-flood and half-ebb currents.

**Rocks reported.**—June 30, 1890, the German steamer *Cleopatra* was lost on a rock off Cape Virgins, eastern entrance to Magellan Strait, on which the French steamer *Ville de Strasbourg* and, presumably, the English steamer *Magellan* had previously struck.

According to the data furnished by the captains of the *Cleopatra* and *Ville de Strasbourg*, this danger lies about 7 miles northeastward from Cape Virgins, in (approximately) latitude 52° 16′ 30″ south, longitude 68° 12′ west.

A sunken rock is reported to lie about 3¼ miles 68° from Cape Virgins in approximately latitude 52° 18′ 40″ south, longitude 68° 16′ 20″ west.

**Nassau Rock,** a small pinnacle with 3 feet over it at low-water springs, lies 127° 3½ miles from Cape Virgins. There is a little kelp on the rock, but not enough to mark it, and except in gales the sea does not break until nearly low water. At extraordinary low spring tides Nassau Rock is dry.

**Tides.**—High water, full and change, on Sarmiento Bank, 8 miles southeast of Cape Virgins, is at 8h. 10m.; springs rise from 36 to 42 feet.

**Cape Virgins,** the north point of the eastern entrance of Magellan Strait, is 135 feet high, and is the best point to make, and usually the first land seen when approaching the strait from the eastward. On it there are several houses. In clear weather the cape is visible from a distance of 20 to 25 miles, and when made from the northward, between the bearings of south and west, will appear as an

extreme of land. Dungeness Spit, 5 miles southwest of Cape Virgins, will not be visible until much nearer. When Cape Virgins bears northward of 273°, Mt. Dinero, 8 miles farther west, will show as a small nipple, opening clear of it.

Capes Virgins and Espiritu Santo have certain points of resemblance, both being marked with white cliffs forming the seaward termination of a range of moderate-sized hills extending into the interior; both have low shingle points connected with them.

All over this eastern portion of the strait the most remarkable difference takes place in the appearance of the land according to the light in which it is seen.

**Light.**—From a pyramidal steel lighthouse, 76 feet high, painted gray, on Cape Virgins is exhibited, 193 feet above high water, a flashing white light, visible 21 miles.

**Telegraph and refuge station.**—A telegraph station and a refuge for shipwrecked mariners have been established on Cape Virgins. There is communication by telegraph with Buenos Aires, and by telephone with Punta Arenas.

**Radio station.**—A radio station is located near the telegraph office between Cape Virgins and Dungeness. Call letters, W C V.

**Virgin Reef,** which at half tide is scarcely perceptible, as then the tidal stream is slack, dries ½ mile east-southeast from Cape Virgins. There are 4 or 5 fathoms close outside the reef, but a vessel should not pass near, as the height of the cape makes it difficult to judge the distance from shore.

**Condor Cliff Anchorage.**—Should a vessel from the northward find the wind so strong as to prevent her entering the strait, an anchorage, sheltered from winds between south by west and northwest, will be found in 8 or 9 fathoms, at 1¾ miles from the shore, with Cape Virgins bearing 196° and Condor Cliff 264°. Caution should be observed in approaching this anchorage, on account of the rocks reported off-lying.

**Dungeness** is a low spit extending 3½ miles from the foot of the low range of hills uniting Cape Virgins with Mount Dinero. The beach on both sides of the Ness is of shingle; and above high-water mark the spit is covered with long coarse grass and a thick undergrowth of scrub, forming a kind of network with the long kelp, which is blown up by the heavy gales and dried in the summer sun. From the quantity of this weed which covers the spit, as well as from the large pieces of wreck found all over it, sometimes more than a mile from either beach, it seems evident that at times in easterly gales the sea must break over its whole extent.

**Beacon.**—A pyramidal-shaped beacon (refuge), 52½ feet high, painted in red and white alternate bands and surmounted by a red ball, stands on Dungeness, 150 yards from high-water mark. It is

visible in clear weather a distance of 12 miles, and may be seen as soon as Cape Virgins has been passed. It has been fitted up as a station of refuge for shipwrecked mariners. This and the other beacons recently fitted up serve only as a shelter.

**Light.**—From a lighthouse on the extremity of Dungeness is exhibited, 87 feet above high water, a flashing white light, visible 15 miles.

Immediately under this light, on the eastern side of the lighthouse, a fixed white light is shown in an arc of 20°, between the bearings 245° and 265°, covering Nassau Rock; it is said to have been seen 21 miles. The lighthouse, 98 feet high and painted red and white in horizontal stripes, is a cylindrical iron tower on a concrete base, with a keeper's dwelling at the foot. It is in telegraphic and telephonic communication with **Punta Arenas.**

**A Lloyd's signal station is at Dungeness.**

**Wreck.**—The wreck of the British ship *Hungost*, wrecked May 10, 1894, lies 1¾ miles 345° from Dungeness beacon.

**Tides.**—High water, full and change, at Dungeness is at 8h. 30m.: springs rise from 36 to 44 feet; neaps, 30 feet.

**Anchorages.**—There is a good anchorage on either side of the spit and very convenient for vessels bound either way to await a change of wind or tide or stop for the night. The bottom is of stiff blue mud, that on the east side being thinly overlaid with stones.

As long as the wind does not haul to the southward of southwest the east anchorage is the better of the two; for, though the squalls may come very hard across the spit, there is no sea until the wind hauls. From this position, if the chain must be slipped or parts, it is very easy to weather the 3-fathom patch and pass on either side of Nassau Rock.

**Zealous Anchorage,** on the west side, is perhaps the better, as the curve of the spit enables a vessel to anchor well under the north shore out of the strength of the tide.

A large vessel should not anchor inside of a line between the beacon on the ness and Mount Dinero, but anchor so as to have a depth of 6 to 8 fathoms at low water; and it must not be forgotten when anchoring anywhere in the eastern part of the strait that allowance must be made for 7 fathoms rise and fall of tide when eastward of the First Narrows, and when westward it will be much less. In Zealous Anchorage a vessel will be sheltered until the wind veers to the southward of west and will have no difficulty in clearing the ness should it blow hard from southwestward. There are two conspicuous sand patches on the face of the cliff from which Dungeness projects, which appear like roads; the easternmost of these should bear about 31° from the anchorage.

**Mount Dinero.**—When southward of Cape Virgins, Mount Dinero, a conical hill 279 feet high, and 8 miles to the westward of the cape, will be seen. From thence the land continues between 200 and 400 feet high, rather level topped, and generally covered with grass and scrub to Cape Possession, 14 miles farther west.

This part of the coast is fronted by a shore of mud and stones, with rocky ledges, which dry at low water, from ¼ to ½ mile off the points. About 3 miles eastward of Cape Possession there is a remarkable bare sandy patch.

**Beacons.**—An iron pyramidal beacon with masonry base, on Mount Dinero, and a similar beason east of it in approximately latitude 52° 20′ south, longitude 68° 24′ west, indicate the boundary between the Argentine and Chilean Republics.

**Wallis Shoal,** with 9 feet water, lies 273° 10 miles from Dungeness. It is connected with the mainland, and no vessel should pass north of it. Cape Virgins, bearing 79° and well open south of Cliff Hill, leads outside this danger. Mount Aymond, seen southward of Cape Possession, and bearing 295° also leads south of Wallis Shoal.

**Cape Possession,** a bold perpendicular headland, 385 feet high, with a deeply furrowed face, is the center of a wavy line of cliffs: and is higher, and has a darker-colored base, than either of the adjoining ones. The land behind it dips so much that the cape makes as an island at 15 or 20 miles distant on either side.

**Light.**—From a lighthouse on Cape Possession is exhibited, 275 feet above the sea, a flashing white light, visible 18 miles. From the eastward the light is not visible north of the line of bearing 294°. This bearing cuts the outer edge of Wallis Bank, and mariners should therefore not lose sight of the light while passing this bank.

The lighthouse, 36 feet high, is a polygonal tower rising from the center of a square building, all painted white.

The light is reported to have been seen 25 miles.

**Beacon.**—A gray pyramidal beacon, 18 feet high, surmounted by a ball, is situated ¼ mile eastward of the lighthouse.

**Refuge station.**—A refuge station is established on Cape Possession.

**Possession Bay,** extending from Cape Possession to the entrance of the First Narrows, affords anchorage, in most parts, though open to winds from the southward.

**Stonewall Anchorage,** in Possession Bay, has a good bottom of stiff blue mud, is well sheltered from the east, and, being free from the strong tidal currents or high seas, is a safe place. During westerly winds a convenient anchorage will be found in the western part of the bay off Tandy Point. Care is necessary in making this anchorage to avoid being set upon Narrow Bank.

**Wreck.**—The wreck of an American yacht lies high and dry on the northern shore of Possession Bay, 1 mile west of the Duck River.

**Water** may be obtained 1¼ miles west of Tandy Point from a small pond just inside the high line of the beach. The next watering place is in St. Jago Bay, where watering is easier, as a heavy surf usually breakes on the beach in Possession Bay.

**Tides.**—High water, full and change, in Possession Bay is at 8h. 35m.; springs rise 36 to 42 feet.

**Narrow and Plumper Banks,** in the western part of Possession Bay, are separated by a channel ½ mile wide with 5 fathoms water, and over, in it. The least water on Narrow Bank is 13 feet, near the center. It may be crossed between half-flood and half-ebb streams, but this should not be done except in case of necessity, especially with the ebb, as the tide falls rapidly and the stream sets strongly across. Plumper Bank is composed of fine sand and dries at low water.

**Light buoy.**—A light buoy, showing a flashing red light, is moored on the south side of Narrow Bank.

**Caution.**—The buoys in Magellan Strait are not to be relied upon, as they are frequently out of position or missing. The beacons are often reported down.

**Plumper Anchorage,** southeast of Plumper Bank, is not recommended, although it may be used as a stopping place when unable to pass the Narrows and anxious not to lose ground.

If intending to anchor here, keep Mount Aymond bearing 341°, making allowance for the tide, till Direction Hill light bears 268°, when there will be about 13 fathoms at low water. The anchor must be let go immediately that the depth is obtained, as any delay may put the vessel in 2 or 20 fathoms, according to the tide.

**Mount Aymond,** 6½ miles inland, is 857 feet high, and has near it to the westward four sharp, rocky summits, named Asses Ears. The mount forms an excellent mark when approaching the First Narrows from the eastward, and can also be seen for some distance westward of them. The appearance of the ears changes much according to their bearing; on some bearings all are seen, and on others only one.

**Direction Hills** will be seen as soon as Cape Possession is passed; they appear, as do the hills near Cape Orange, like islands. When approached on a 265° bearing, about 10 miles distant, they show on a lighter background of about the same apparent elevation; the northernmost and highest hill, 224 feet above the sea, is the best object to steer for on the above bearing, in order to gain the fairway of the First Narrows.

**Beacon.**—A pyramidal-shaped beacon (refuge), 52 feet high, painted in red and white horizontal bands, and surmounted by a red ball, stands on the northern and highest Direction Hill.

**Light.**—An unwatched flashing white light, elevated 210 feet above the sea and visible 15 miles, is located on Direction Hill.

The light is shown from a circular iron tower, 9 feet high, on a square wooden platform, the whole painted in red and white bands, standing 33 yards south-southeastward of the beacon.

For details and sectors see Light List and Chart.

**Tides.**—High water, full and change, under Direction Hills is at 8h. 53m.; springs rise 38, feet, neaps 23 feet.

### EASTERN ENTRANCE TO FIRST NARROWS—SOUTH SHORE.

**Cape Espiritu Santo,** the southern point at the eastern entrance of Magellan Strait, is a steep white cliff about 190 feet high, and is the seaward termination of the range of hills (Sierra Balmacedos) which extends across the northern part of Tierra del Fuego from Cape Boqueron. Gap Peak is the highest part of this range.

The cape does not show as an extremity until the vessel is inside of the strait. When seen from seaward it appears as the highest part of a line of white cliffs indented by bays, which give it the appearance of having had gaps cut in it. As the land is raised a remarkable detached lump of cliff, appearing like an island, will be seen in the bay to the southward of the cape. The land must not be approached closely, as eastward from the cape the low-water line extends a mile off, while farther north it dries 1½ miles from shore.

**Boundary Beacon.**—A triangular pyramid, 16 feet high, and painted red, has been erected a little more than a mile northwestward from Cape Espiritu Santo. The beacon is at the edge of the cliffs, about 55 yards from the sea, and serves to mark the boundary line between Chile and Argentina. It may also be of some service to mariners navigating in the vicinity, though it is only visible short distances.

**Catherine Point** is similar in appearance to Dungeness; it seems very low when the tide is high, but the difference which a change of level from 30 to 40 feet makes in the appearance of such spits must not be forgotten when estimating the distance.

**Tides.**—High water, full and change, at Catherine Point is at 8h. 5m.; springs rise 30 feet. In Lomas Bay off Catherine Point the tidal streams turn at high and low water by the shore.

**Sutlej Anchorage,** about midway between Cape Espiritu Santo and Catherine Point, is good for large vessels. The great advantage of this anchorage is that there is no lee shore with the prevailing wind.

It is not advisable to bring Catherine Point to the westward of 278° in picking out a berth, as north of that line the tide is so strong as to cause a vessel to be tide-rode even in a gale, and to roll heavily.

**Lomas Bay,** between Catherine Point and Cape Orange, 23½ miles to the westward, is a large bight almost entirely filled by banks which dry at low water.

The bay is not recommended as an anchorage on account of its approach being rendered intricate by the surrounding banks and also its distance from the fairway.

**Great Orange Bank.**—From Catherine Point a bank composed of fine dark sand extends nearly 3 miles westward and follows the trend of the coast at 4 to 5 miles distant in the bay; thence curving with the coast to the northwestward as far as Anegada Point it forms Great Orange Bank, the north extreme of which terminates in a point about 8¾ miles northeast of Cape Orange. Owing to the rapidity of the tidal streams through the First Narrows, its northern edge from Anegada Point is abruptly cut off in line with the south shore of the narrows.

**Light buoy.**—A light buoy, showing a flashing white light, is moored on the edge of Great Orange Bank. Too much reliance must not be placed on this buoy.

**Spiteful Anchorage,** eastward of Great Orange Bank, will be found very secure in westerly and southwesterly gales. The strength of the tidal currents is its only disadvantage, though much strain is taken off the cable during the flood current, with which westerly winds generally freshen. Here the tide turns one and one-half hours after high and low water.

Although a vessel may approach Cape Orange on a west bearing to a distance of 8 miles, the unevenness of the bottom and strength of stream setting across this line render it inadvisable to do so.

**Cape Orange,** about 8½ miles southeast by south of Direction Hills, terminates in a sharp conical hill 152 feet high, and is unmistakable. As the cape is approached a remarkable white patch of cliffs will be seen on its east face.

**Beacon.**—A triangular pyramid 36 feet high, painted white and surmounted by two red cages, has been erected on Cape Orange. This beacon is on the slope of the hill marked 152 feet on the charts, but the data furnished states that it is 203 feet above the sea.

### FIRST NARROWS.

**North shore.**—The channel is 10 miles long northeast and southwest, and 2 miles wide, with cliffy shores and an average depth of 40 fathoms.

**Delgada Point,** on the west side of the north entrance, has a small settlement on it.

**Light.**—A fixed white light with two red sectors is exhibited from a lighthouse on Delgada Point. It shows red in a sector of 26° over Plumper Bank, and red in a sector of 6° over Satellite Patch. The light, 48 feet above the sea, illuminates an arc of 170° and is visible 10 miles.

The lighthouse consists of a white iron tower, 20 feet high, clear of all other houses.

There is a signal station at the lighthouse connected with Punta Arenas by telegraph.

**Visibility.**—On the night of April 6, 1912, Delgada Point Light was clearly visible at a distance of 20 miles with a height of the eye of 36 feet. The night was clear and dark.

**Anchorage.**—There is a good anchorage in the bight between Delgada Point and Malvinas Point, sheltered from prevailing winds and out of the strength of the tide. The bottom is stiff clay. It is at all times a safe berth for small vessels and to be preferred to Possession Bay.

**Directions.**—In standing in for it, keep Malvinas Point bearing 290° and anchor when Delgada Point bears 217°, 600 yards offshore. The water shoals suddenly from 30 to 3 fathoms, when the vessel will be out of the tide. The houses serve as excellent landmarks, both for Delgada Point and anchorage, which is directly in front of them.

Landing can be effected on this point, and at the next point westward there is a hard sand bank suitable for beaching vessels.

**Beacons.**—There are two range beacons on Malvinas Point, which, when in line bearing 288°, lead to the anchorage.

**Nuñez Head** will be recognized as a triangular cliff.

**Barranca Point** may be known by its low cliffs, the only ones in this vicinity. It is on the west side of the south entrance to the First Narrows.

**Beacon.**—A beacon has been erected on the summit of Barranca Point. The beacon consists of a white iron framework 33 feet high, pyramidal in shape, and surmounted by two balls.

**Light.**—A flashing white light is shown on Barranca Point, visible 10 miles.

The light is exhibited 37 feet above the sea from a skeleton iron tower on a concrete base, the lantern and tower painted white, located 1½ miles 80° from Barranca Point Beacon, and is visible from seaward over an arc of 215° from 223° to 78°, being obscured elsewhere by the land.

**Satellite Patch,** nearly 1 mile 146° from Barranca Point, is usually marked with kelp, but with both the tide and wind strong it is run under from half-flood to half-ebb streams. The outer edge of this patch is steep-to, but its inner edge joins Barranca Point. There is a least depth of 3 feet on this patch at low water.

It will be noted that one red sector of Delgada Point Light covers Satellite Patch.

**Tides.**—High water, full and change, in the First Narrows is at 8h. 57m., and the strength of the stream is from 5 to 8 knots. There is no slack water, the stream changing three hours after high and low water.

**South shore.**—From Anegada Point the south shore trends in a southwesterly direction 7 miles to Mendez Point, 102 feet high, thence more southerly 3½ miles to Baxa Point; this shore affords no anchorage except in the bight between Anegada Point and Espora Point at 3¾ miles southwest of it, where a small vessel may anchor out of the strength of the tide.

**Angle Hill,** 124 feet high, at 2 miles south of Anegada Point, is conspicuous, having the same apparent elevation and conical appearance as Cape Orange, only more regular in outline.

**Schooner Anchorage,** available for small vessels, is situated southwestward of Anegada Point. Caution should be observed here on account of a wreck, not marked, which is continually shifting its position.

**Mendez Point—Light.**—An unwatched flashing white light, visible 13 miles over an arc of 186° from 40° to 226° and obscured elsewhere, is located on Mendez Point.

The light is shown 93 feet above the sea from a lantern with a white and red horizontally striped roof, surmounting a white cylindrical iron tower 7½ feet high, inclosed by a wooden fence 6½ feet high, in the form of a square, painted white and red in horizontal bands.

**Baxa Point,** when bearing 166°, appears as an extreme point of land on the south side of the west entrance to the First Narrows, and may be known by being the fourth cliff from the southward.

**Beacon.**—A pyramidal beacon (refuge), 52 feet high, painted in red and white horizontal stripes, and surmounted by two red balls, stands on Baxa Point.

**Wreck.**—The wreck of the German steamer *Utgard* lies about 1,700 yards 300° from Baxa Point Beacon. As the wreck of the *Corocoro*, sunk about 2 miles northward of this position, is no longer visible, mariners are cautioned against mistaking the wreck of the *Utgard* for that of the last-mentioned vessel.

**Gulf of St. Vincent Rock,** with 18 feet of water or less on it and deep water close to the westward, on which the British steamer *Gulf of St. Vincent* struck, when edging inshore to escape the strength of the adverse stream through the First Narrows, lies approximately 1⅓ miles 324° from Baxa Point, between the soundings 8 and 32 fathoms and outside of the 10-fathom line shown on the charts.

**Dixon Hill,** 232 feet high, 3½ miles east of Baxa Point, can not be seen until it is open south of the point, unless from an elevation of 26 or 30 feet, when the top of the hill will be visible over Baxa Point bearing 113°. Dixon Hill will be seen in clear weather from the westward at a distance of about 20 miles, and may be known by having two mounds slightly rounded, the southern being a little higher and darker and apparently only half the breadth of the northern.

### FIRST TO SECOND NARROWS—NORTH SHORE.

**St. Jago Bay,** on the west side of Barranca Point, affords anchorage in 5 to 11 fathoms. In easterly winds the best anchorage is on the west edge of Barranca Bank, where the kelp forms a breakwater. Indeed, the kelp is often most serviceable in this respect in these large bays, as the water is almost invariably smooth in it or under its lee. During westerly winds the best anchorages are under Valle Point or in Gregory Bay.

Standing westward, if, on passing Barranca Point it is plain that Gregory Bay can not be reached, the vessel should continue the midchannel course until 2 miles past Satellite Patch with the stream of the ebb (1 mile with the flood stream), and then haul in for Gregory Shoulder. This will lead between the two banks, when the land may be closed if it is desired to anchor. Irregular changes in the soundings must be expected, as the bottom is very uneven all over the bay. Valle Point is steep, and with the hills at its back can not easily be mistaken.

**Barranca Bank** extends a mile southwest from Satellite Patch, nearly in line with the coast, and occupies the whole northeast part of St. Jago Bay.

**Triton Bank,** on which the depth is 7 feet at low water, lies nearly in the track midway between the First and Second Narrows, and is composed of sand, being an exception to the general rule of the shoalest parts, which are almost invariably formed of shingle. This bank is reported to be extending to the southward. The tide streams set strongly over it and there is usually a ripple near the shoalest spot.

**Lightbuoy.**—The southern edge of the bank is marked by a lightbuoy showing a flashing white light, but the light is frequently extinguished and should not be relied upon.

**Shoal.**—A small sandy patch with about 24½ feet of water over it, on which the steamer *Ettrickdale* struck in 1898, is reported to lie 1 mile 165° from Triton Bank Buoy. The position of this shoal is doubtful, and it is recommended that Baxa Point Beacon should not be brought to bear eastward of 70° until clear of Triton Bank.

**Tides.**—High water, full and change, in St. Jago Bay is at 9h. 27m.; springs rise 20 feet, neaps 15 feet; and on Triton Bank at 9h.; springs rise 15 feet.

**Appearance of the land.**—When abreast Triton Bank, Mount Sutlej, 10 miles west of Direction Hills, will begin to show out clear of the range at the back, forming a good mark; in some lights Useful Hill (176 feet), 12 miles west of Barranca Point, one of several peaked hillocks in this vicinity, will also be seen as a small double hill close to the shore over Valle Point, the west entrance point of St. Jago Bay; and in clear weather Gap Peak will be seen on the south side of the strait.

Under ordinary circumstances Gregory Range, westward of St. Jago Bay, appears quite level, and the ground seems to rise in a regular slope from the water's edge to the top of the ridge; but if brought into relief by light, or when covered with snow, the whole face of the range will be seen to be a series of ridges and deep ravines, and a row of small hills will appear fringing the coast, between which and the commencement of the ascent to Gregory Range there is a long valley.

Except in thick weather, before passing Triton Bank, Cape Gregory and the Hummock, 260 feet high, will be seen on the north shore appearing like islands, and a remarkable conical hill, Sharp, may be seen on the Fuegian side, which is a good guide until St. Simons Head comes into view.

Even in thick weather the west shoulder of Gregory Range will be seen frequently through the mist. A bearing of it will show the progress made. If the head is attended to and attention paid to the courses no danger need be apprehended, for if soundings are obtained less than 12 fathoms, after hauling up for the Second Narrows, it is evident that the vessel is too far to the northward and should be edged away a little. Unless a vessel is a long way out of her course that depth will not be found to the southward; moreover, the latter could hardly happen, owing to the set of the tide streams.

**Tribune Bank,** midway between Triton Bank and Cape Gregory, has 3¼ fathoms on it, and vessels hauling in for an anchorage in Gregory Bay should keep the lighthouse on the Cone, a hill 135 feet high, at 3 miles south of the Hummock, well open of Cape Gregory, bearing 267°, till Gregory Shoulder bears 300°, in order to clear it. Here, as elsewhere, allowance must be made for the tide.

The banks Tribune, Triton, Barranca, and Satellite, though treated as separate banks for the purpose of description, are more properly one continuous ridge, connected by the 10-fathom line of soundings. The rapid tide as it sweeps out of either narrows seems to be divided here by the opposite one, which it forces backward, and as it sweeps

into the bays on either hand it deposits its load of sand and shingle on the banks.

**Cape Gregory,** 22 feet high, rises to a sandy hill of 209 feet about a mile to the northward.

**Gregory Bay** affords anchorage in 12 to 13 fathoms between 2½ and 3½ miles northeast of the cape.

On account of the prevalent gales, it is advisable to anchor well under the north shore. If the south shore of the Second Narrows is visible, Sweepstake Foreland, between St. Simons Head and Cape St. Vincent, just shut in by Cape Gregory, is a good mark for anchoring. In weighing for the westward with the tide, stand well out into the Narrows before keeping away, to avoid being swept around into shoal water to the southward and westward of the cape.

**Sara Port.**—A frozen-meat factory, known as Sara Port, is located in Gregory Bay ¾ mile northward of Cape Gregory. A pier extends 400 yards in an easterly direction from the high-water line at the factory; near the head of the pier is a signal staff and some buildings, the northern of which has a chimney. The office buildings, which have red roofs, are situated nearly a mile north-northwestward of the pier.

**Lights.**—Temporary electric lights are shown on and near the pier when vessels are loading.

**Caution.**—The low-water line northward of the pier is reported to have extended seaward.

**Tides.**—High water, full and change, in Gregory Bay is at 9h. 30m.; springs rise 21 feet, neaps 12 feet. The time of the turning of the flood stream here with reference to the Second Narrows seems doubtful. It has been stated that it turned two and one-quarter or three hours earlier at the anchorage than in the Narrows; though several trials have shown this to be the case sometimes, it is not always so, and it is probable that the turning of the stream depends on the wind and the position in which the ship is anchored.

### FIRST TO SECOND NARROWS—SOUTH SHORE.

**Philip Bay** comprises the whole of the south shore between Baxa and St. Isidro Points. In it are several anchorages, but they are more exposed to the prevailing winds than those in St. Jago Bay. The land on the south shore of Philip Bay is low, with a row of small hills like those on the north side fringing the coast, behind which the land gradually rises toward the range of high ground which has been said to extend from Cape Espiritu Santo to Cape Boqueron, and of which Gap Peak, 925 feet high, forms the only point useful to the mariner. In some lights the coast hills stand out clearly, but generally the land appears to slope from the beach to the back range.

**St. Isidro Point,** the south point of the eastern entrance to the Second Narrows, is low and sandy with a reef off it. The shore flat, which extends out about 6 miles from the center of Philip Bay, is only ¾ mile from the shore off St. Isidro Point, and the water deepens suddenly from 12 feet to 37 fathoms.

**Barnacle Reef,** 3 miles east of St. Isidro Point, has on it 16 feet water and is the only rocky ledge between the First and Second Narrows.

**Anchorages.**—In the northeast part of Philip Bay anchorage sheltered from southeasterly winds may be obtained in 5¼ fathoms, with Baxa Point bearing 17°, distant 3¼ miles; or farther to the southward in 10 fathoms water, with the point bearing 23° and Black Hill (104 feet high) at 5½ miles south of Baxa Point, bearing 96°. When leaving this anchorage for the westward with a fair tide steer for Gregory Shoulder until well out in the fairway, to avoid being set down on the foul ground at the head of the bay.

In the bight east of St. Isidro Point good anchorage may be obtained, well sheltered from southwesterly winds. Proceeding for this anchorage, steer in with Double Peak, a hill over the southwestern part of the bay, bearing 205°, which will lead over the tail of Barnacle Reef in 9 fathoms, and when the Cone light on the north shore of the Second Narrows bears 293° a vessel may anchor in 14 fathoms, sand and shell. This will be found a convenient stopping place if caught by the ebb stream too late to cross to Gregory Bay or to reach Royal Road.

**Tides.**—High water, full and change, in Philip Bay is at 9h. 29m.; springs rise 17 feet. The west-going stream makes three hours before high water by the shore, and runs till three hours after.

### SECOND NARROWS.

**North shore.**—The Second Narrows are about 12 miles long southwest and northeast and from 4 to 6 miles wide. The north shore recedes between Cape Gregory and Gracia Point and is bordered by a bank with shoal water extending out to the line joining the cape and point. These shoals consist of a sand bank that dries at low water, with its east end 1½ miles 259° from the cape, while 5½ miles 248° from the cape is Halfway Shoal, 1 mile in length, with 3¼ fathoms on it. Susannah Cove, inside these shoals, is only fit for boats. At Gracia Point the bank extends off ½ mile, with 6 feet over it, and is steep-to.

**Cone Hill—Light.**—An unwatched flashing white light is shown from a lighthouse erected on Cone Hill, north shore of the Second Narrows. The light is exhibited 144 feet above high water from a cylindrical iron tower 9 feet high, the upper half painted white and

the lower half red, and is visible 12 miles over an arc of 180° from 244° to 64°. The light is obscured by the high land of Cape Gregory, northward of the bearing 262°, and it is proposed to obscure the light by a screen northward of the bearing 268° so as to lead clear of Tribune Shoal

A square building with white top stands in rear of the lighthouse.

**Tides.**—High water, full and change, at Gracia Point is at 10h. 17m.; springs rise 8 feet, neaps 7 feet.

**South shore.**—The south shore is higher than the Patagonian and is straight and steep-to. From St. Isidro Point the shore of the Second Narrows trends in westerly direction 6 miles to St. Simon Head, 225 feet high, thence curving gradually to the southward for 5½ miles to Cape St. Vincent, 184 feet high, the southwestern entrance point of the Second Narrows.

### SECOND NARROWS TO CAPE PORPESSE—PATAGONIAN SHORE.

**Oazy Harbor,** 1½ miles westward of Gracia Point, has a narrow entrance and a space within for anchorage ¼ mile in extent. All the rest is dry, or nearly so, at low water.

**Tides.**—High water, full and change, in Oazy Harbor is at 10h. 18m.; springs rise 7 feet, neaps 6 feet.

**Whitsand Bay,** adjoining Oazy Harbor, affords anchorage in 2 to 4 fathoms, well sheltered from westerly winds.

**Port Zenteno (Pecket Harbor)** is 5 miles westward of Oazy Harbor, and though the anchorage ground is confined, a steamer, with care, may pass in and out. With westerly winds a disagreeable sea gets up quickly in this harbor, and makes it dangerous for boats. The distance between the two points forming the apparent entrance is 1½ miles, but between Perno Point on the north side and Plaid Island at 1 mile within the entrance the whole space is shoal, upon the greater part of which the sea breaks in a moderate breeze, while the navigable channel between Plaid Island and Puño Point (a sand spit steep-to) on the south is only about 200 yards wide.

**Buoys.**—A black cylindrical buoy is moored 1,400 yards 56° from Zenteno Point; a red conical buoy, 1,360 yards 259° from the beacon on Pitcher Island, is on the eastward side of the channel which leads to Crooked Channel.

**Daymarks.**—A red-and-white beacon stands on the summit of Pitcher Island; other beacons for the guidance of the small trading steamers proceeding to Crooked Channel have been erected at various points on the shore of the harbor.

The mole has collapsed and can no longer be used, and the mooring buoys have been withdrawn.

The hut on the summit of Arenoso Hill, which served as a landmark, no longer exists.

**Directions.**—Pass to northward of the black buoy off Zenteno Point, and bring the beacon on Pitcher Island in range with Puño Point. Stand in on this, and pass Puño Point 150 yards off; then keep in mid-channel, about 300 yards offshore, and anchor with the remains of the mole bearing about 150°, 600 yards distant.

**Crooked Channel.**—Two arms extend from the west side of the harbor, the Southern or Straight Arm being of no use to vessels, while the Northern or Crooked Channel is deep, and runs nearly 2 miles in a westerly direction, then opens into a shallow lagoon, which again is connected by a shallow, narrow channel with a larger and deeper lagoon named Cabeza del Mar, which lies in the direction of Otway Water.

Wild fowl abound in Port Zenteno during March and April.

**Shoals off.**—A shoal of 3½ fathoms is situated 1½ miles east-southeastward of Zenteno Point, and a shoal of 3¾ fathoms at about 1¼ miles south-southeastward of the same point.

**Tides.**—High water, full and change, in Port Zenteno is at 9h. 30m.; springs rise 7 feet, neaps 6 feet.

The tide loses some of its force on entering the harbor, in which, though the flood tide is strong, the ebb is not much felt.

**Anchorages.**—There is a good anchorage in 6 or 7 fathoms outside the harbor, southeastward of Zenteno Point; one also between Port Zentono and Whitsand Bay, in 6 or 7 fathoms, with Cape St. Vincent bearing 109° and Santa Marta Island 161°.

**Royal Road** is between Elizabeth Island and the main. Vessels may anchor in security out of the strength of the currents in any part of the road, although the berth off the north end of Elizabeth Island is preferable.

**The Middle Ground,** with 2½ fathoms least water, lies nearly midway between Port Zenteno and Elizabeth Island. The north extreme of Elizabeth Island, in line with the south side of Santa Marta Island, leads southward of the Middle Ground.

A vessel of moderate size proceeding through Royal Road may pass eastward of the Middle Ground, keeping along the west side of Elizabeth Island at ½ mile distant until Cape Thorax bears about 128° and the passage is well open, when steer for Cape Porpesse, to avoid being set into the shallow water off Shoal Haven. Laredo Bay is preferable to the anchorage north of Cape Porpesse in southwest winds.

When the wind and current are opposed to each other a dangerous race ensues for boats in Pelican Passage between Cape Thorax and the mainland.

**Tides.**—High water, full and change, in Royal Road is at 9h. 47m.; springs rise 8 feet.

**Elizabeth Island** is 8 miles northeast and southwest, with an average breadth of 2 miles, and is composed of ranges of hills extending in ridges nearly in the direction of its length. The highest elevation is 178 feet near the south end of the island. A bank with 4 fathoms least water and 16 to 20 fathoms close-to, extends in a southeasterly direction 1 mile from Tern Point, the southeastern extreme of the island.

**Anchorage.**—If unable to make Laredo Bay or Punta Arenas, good anchorage will be found in 7 fathoms of water off the northern end of the island. When using this anchorage allowance must be made for the set of the currents, especially after dark. Should Elizabeth Island seem very close without soundings the vessel is sure to be too far to the eastward and must edge away to the westward until a proper depth is found.

The anchorage on the east shore of the island is abreast of a remarkable gap between Sylvester and Alfred Points, bottom of coarse sand and shell, in 8 to 10 fathoms.

**Santa Marta Island.**—Marta Bank, with 2 to 9 fathoms water, and 15 to 26 fathoms close around, lies 3½ miles south of Second Narrows and 1⅓ miles east of Sylvester Point. It is 5½ miles long, north and south, with an average breadth of about ½ mile. In the middle of this bank stands Santa Marta Island, rising in perpendicular cliffs 96 feet above the sea, flat topped, and sloping slightly to the eastward. A reef, which dries, extends ¼ mile from it in a northeasterly direction. As the east-going stream sets strongly across this bank, it is recommended to keep well on the Elizabeth Island shore in passing.

**Light buoy.**—A buoy, marked MARTA BANK, moored in 6 fathoms, eastward of a 2-fathom patch named Bajo Marta, near the northeastern extreme of Marta Bank, exhibits a flashing red light.

**Santa Magdalena Island** has four or five small hills by which it can not fail to be recognized, especially when coming from the westward, the highest of which, at the southwest end, rises 136 feet perpendicularly from the water. The 10-fathom line extends nearly 1½ miles north and south, and 2 miles east of this island, and should not be closed inside this line by passing vessels. Kelp and tide ripplings mark the edge of deep water to the northeast, and sometimes these may be seen to the southwest.

**Light.**—From a lighthouse in the center of the above island is exhibited, 141 feet above the sea, a flashing white light, visible 17 miles in all directions.

The lighthouse is a cylindrical iron tower, painted white, with a red lantern, and copper-colored dome. The keepers' dwellings are white with red roofs.

**Shoals.**—A sunken danger lies about 1 mile from the northwest side of Santa Magdalena Island. The German steamship *Setos* is reported to have struck on this shoal, which, from bearings taken at the time, but of objects that leave a considerable doubt as to the exact position, lies with the southwest extreme of Santa Magdalena Island, bearing 195°, approximate, distant about 1¼ miles. The danger is probably of small extent, as immediately after striking (the vessel heeling over) soundings of 9½ fathoms were obtained.

A shoal of 3 fathoms lies with the southwest point of the island bearing 183°, distant 1,100 yards; a shoal of 4¼ fathoms lies with the same point, bearing 149°, distant 1,200 yards; and a shoal of 3½ fathoms with the northeast point of the island bearing 307°, distant 1½ miles.

**Light buoy.**—From a buoy, moored in 10 fathoms on the eastern edge of the 3½-fathom shoal southeastward of the island, is exhibited a flashing white light.

**Wreck.**—The wreck of the steamer *Atlantique* lies sunk in a position with Santa Magdalena Island north extreme bearing 288°, distant 1,133 yards, and Santa Marta Island summit 346°.

**Caution.**—The tide does not run fairly through the channel between Santa Magdalena and Santa Marta Islands, and as rocky heads may exist on the banks surrounding both the islands bordering it, on which much kelp at times grows, it should never be used at night.

**Walker Shoal,** with 3¼ to 9 fathoms over it and from 20 to 37 fathoms around, lies between Santa Magdalena and Elizabeth Islands. It is about 4 miles northeast and southwest, and from ⅓ to 1 mile wide. The northern and broadest part of this shoal is separated by a narrow channel, with depths of 13 to 17 fathoms, from a smaller shoal 1¾ miles long and ⅓ mile wide, which lies parallel to Walker Shoal, and on which the depth is from 4¾ to 9 fathoms.

The stream runs from 3 to 5 knots between Walker Shoal and Santa Magdalena Island.

**Buoy.**—A cylindrical buoy, painted black, with the word "Walker" on it in white letters, surmounted by a black cylindrical cage, is moored in 30 feet of water on the southwestern part of Walker Shoal, and indicates that it is a port-hand buoy for vessels passing through Queen Channel. The position of the buoy is unreliable.

**Shoal.**—About 2½ miles off Cape Negro, and southwestward of Walker Shoal, the U. S. revenue cutter *Grant* encountered an extensive kelp patch not shown on the charts. The commander of the Chilean gunboat *Condor* stated that he sounded over this patch and

found 8 to 10 feet of water. This shoal lies in a position very dangerous to vessels using Queen Channel, or running out from the anchorage in Laredo Bay.

SECOND NARROWS TO MAGDALEN SOUND—TIERRA DEL FUEGO SHORE.

**Lee Bay.**—On the south side of Cape St. Vincent the land recedes and forms a deep bight named Lee Bay. The bay is 9 miles wide between Cape St. Vincent and the south entrance point but New Bank, with 7 feet least water, extends from Cape St. Vincent halfway across the entrance.

Anchorage in the bay is not recommended.

**Lightbuoy.**—A lightbuoy, exhibiting a flashing white light, moored in 5 fathoms, marks the western extremity of New Bank.

**Jente Grande Bay** is generally shallow, with 6 to 7 fathoms in the center decreasing toward the shores; in the channel south of Quartermaster Island there are depths of from 9 to 17 fathoms. This channel is recommended for entering, as the currents have less effect than in the passage north of the island, and the shoals on either side are generally made out by changes in the color of the water rather than by kelp.

**Serpiente Bank,** dry at low water, extends for upward of a mile east from the northeast end of Quartermaster Island. It is distinguished either as a sand bar or by tide rips.

Care should be exercised in anchoring not to approach the shores too closely, because of the off-lying banks. Clarencia Cove, in the northeast part, affords anchorage nearer the shore, but it is exposed to the southwest winds. On the southern shore, east of Hobbs Cove, are some farmhouses and a small pier.

**Quartermaster Island,** 68 feet high, lies across the entrance to Jente Grande Bay. A long spit dries upward of a mile from the northeast end. The south end of the island is composed of sand covered with grass, eastward of which anchorage may be had in 5 to 7 fathoms, with the extremes of the island bearing about 343° and 251°.

**Beacon.**—A beacon is erected on high ground near the middle of Quartermaster Island, which may serve as a guide through New Channel. This beacon and Double Peak, northeast of Jente Grande Bay, are useful marks for entering the bay by the southern channel.

**Coast.**—The coast from Jente Point trends south 21 miles to Cape Monmouth, thence southeasterly 10 miles to Cape Boqueron, a precipitous headland, forming the abrupt termination of the high land extending across the country from Cape Espiritu Santo. The shoulder of this range over the cape forms a most conspicuous mark from the neighborhood of Sandy Point.

There are no outlying dangers along this part of the coast, and the water shoals gradually to the shore.

**Porvenir Bay,** 2 miles north of Cape Monmouth, is available for small craft. With the assistance of a pilot, or by buoying the channel, a vessel drawing 13 feet could enter at high water, otherwise the channel should not be attempted. The entrance is 1,200 yards wide, with 2 to 3¼ fathoms, but ½ mile farther in the width considerably decreases, and there is only 9 feet water.

After a sharp turn to the northward round a sandy point the Narrows are reached between the north shore and a long sand spit projecting from the opposite side, leaving a passage 100 yards wide, with 4 fathoms in the center.

Inside it opens out to a basin 2 miles long and ½ mile wide, but a great part of it is shallow, and banks obstruct the deeper portions. The *Sylvia* anchored in 4 fathoms just outside the entrance on a stiff-clay bottom. The tide runs very strong in the entrance.

Porvenir Bay is the headquarters of the gold diggers working the hills behind it; there are also ranches here. In the vicinity of this bay are about 500 people, while the total Chilean population of Tierra del Fuego numbers some 1,500; a small Chilean military establishment is maintained here. There is communication between this settlement and Punta Arenas by a small steamer.

**Beacons.**—On Victoria Point stands a beacon, plainly visible; two pairs of leading beacons stand to the westward of Chilota Point for leading into the bay and up to that point, and west of Anita Point are two beacons forming a back range for entering through Solar Pass.

**Useless Bay,** east of Cape Boqueron, is 33 miles deep and 16½ miles wide at the mouth. It is entirely exposed to winds from the west and southwest, and there is not a sheltered anchorage in it. The bottom is irregular and bad holding ground.

**Shoal.**—A shoal about 5 miles long northeast and southwest, on which the sea breaks with an ebb tide, lies on the north side of Useless Bay about 4 miles from its head. Between this shoal and the shore there is a passage about 3 miles wide, with 4½ fathoms at low water. The shoal is particularly dangerous at high water, as it is not then marked by breakers. In order to clear it, a vessel should pass about 1½ miles from the shore.

**Anchorages.**—On account of the grazing industry, five points on the shore are used as landings: Esperanza Cove, 8 miles east of Cape Boqueron, is a small indentation, distinguishable for only a short distance; Discordia Cove, 15 miles east of the cape, affords anchorage in 4½ fathoms, 300 yards from shore; at Josefina Cove, 22½ miles east of the cape, the anchorage is bad; Port Nuevo, in the northeast end of the bay, has a landing place for boats and launches, but the anchorage is 1½ miles from shore, in 5 fathoms, stones. In the middle of the southern shore of the bay is McClelland Cove; anchorage

may be had at 400 yards from the shore in 3¼ fathoms, sand. Fresh meat and good water may be obtained here.

**Whiteside Channel.**—This broad channel separates Dawson Island from Tierra del Fuego and extends from the southern point of Useless Bay to Admiralty Sound. It is clear of dangers and deep; the eastern shore, which is low and fronted with shallow water, should not be approached within one mile; the western shore has no known dangers off-lying, and may be approached to a distance of about ¼ mile.

**Port Yartow,** 8½ miles south of Cape Nose, southern point of Useless Bay, is formed between Points Chown and Yartow and a chain of three small islets. The westernmost islet is marked by a stone pyramidal beacon, painted white. There is anchorage here for any class of vessel, in 10 or 15 fathoms of water.

**Dawson Island** is 45 miles long north and south and 18 miles across the broadest part. Cape Valentyn, its northern extremity, is low, with a small hummock near the extremity, and becomes visible from the fairway of the strait when between Freshwater Bay and Port Famine. A bank with 3 and 4 fathoms marked by kelp extends from the east extreme of the cape in a northwesterly direction for 2 miles. The tides rush over the bank, forming, in a contrary wind, races probably at times dangerous to boats. The bank has only been partially examined. Caution should be observed in coasting along the west shore, on account of the imperfect nature of the surveys.

**Willes Bay.**—From Cape Valentyn the eastern shore of Dawson Island trends in a southerly direction 14 miles to Kelp Point, thence west-southwest 1¼ miles to Willes Bay, which may be known by Offing Island. This bay, although of small extent, affords good anchorage in 9 or 10 fathoms, mud bottom. At the head of the bay is Gidley Cove, where a small vessel may lie in perfect security. The entrance to this cove is narrow, with a depth of 2¾ fathoms; within the cove the depth is from 3 to 5½ fathoms.

**Tides.**—High water, full and change, in Willes Bay is at 12h.; springs rise 6 feet.

**Harriss Bay,** south of Willes Bay, is an indenture of the coast, 2 miles deep. A rock, with a depth of 5 fathoms on it, and marked by kelp, lies in the middle of Harriss Bay, with Tree Bluff bearing about 162°, distant 1½ miles. A depth of 14 fathoms was found in the northern part of the bay.

A mission station, with an extensive Indian settlement, is located here. Fresh meat and vegetables, in season, may be obtained; water is scarce.

**Fox Bay,** south of Harriss Bay, affords good anchorage in 11 fathoms, sand and shells, with the summit of Tree Bluff (Mirador Hill) bearing 26° and the mouth of the Fox River 310°. This river,

the largest one known on Dawson Island, has formed an extensive bank in the head of the bay.

**Nonentry Bay,** 6 miles south of Fox Bay, is only a small cove; if anchoring here, let go when the heads are in line, in 11 to 13 fathoms, as the water shoals rapidly toward the head of the bay.

**Wickham Island** is situated in an indentation of Dawson Island. Sharp Peak, on this island, is visible in clear weather from Port Famine.

**Meskem Channel,** north of Wickham Island, is deep and apparently free from dangers, with the exception of a kelp patch situated 600 yards northward of the northeast point of Wickham Island. A rock, dry at low water, is situated close to the shore northeastward of Huapi Point, 2 miles eastward of Port Meskem.

**Port Meskem,** situated on the northern side of Meskem Channel, is about ¾ mile wide and 1 mile deep. It affords anchorage for vessels of any size, sheltered from all winds and from the sea, in 16 fathoms, mud bottom. The south side of the port is formed by Cannon Point, off which is situated Meskem Islet, having its summit covered with trees and forming a good landmark.

A rock, which covers at high water, lies about 250 yards south of the islet, and is marked by a beacon surmounted by a white cone. The channel between Cannon Point and Meskem Islet is obstructed by kelp and should not be attempted.

An abundant supply of good water can be obtained from a creek which flows into the head of the port.

**Port Owen,** a deep bay, 8 miles long and 2 miles wide, has moderate depths over a mud bottom. The southern shore should not be approached, on account of dangers off-lying.

**Anica Channel,** a little over 5 miles long, connects Port Owen with Brenton Sound; it is deep, and no dangers are known to exist, except a rock awash at low water, situated about 1 mile northward of Port Coisel.

**Port Coisel,** in the northwestern part of Brenton Sound, is two-thirds of a mile wide and 1⅛ miles deep. The inner part of the port is filled with mud brought down by the streams that empty into it; the outer part affords anchorage for vessels of any size in 13 fathoms, mud bottom. This port is protected from all winds except those from the southeast, which are rare and of moderate force. Comkitu Islet, situated opposite the entrance to the port, will be of aid in recognizing it.

**Brenton Sound** lies between Wickham Island and the southern extremity of Dawson Island. The Tucker Islands are situated in the southeastern part of the sound.

**Admiralty Sound,** at 23 miles south of Useless Bay, extends 43 miles to the eastward into the island of Tierra del Fuego. It is 9

miles wide at the entrance, and gradually diminishes to 3 miles. On its north side the shore is straight, but the south side has three deep inlets, named Brookes, Ainsworth, and Parry Harbors. The sound terminates in a bay, affording anchorage in 10 to 15 fathoms, but is much exposed to northwest winds, which, from the funnel shape of the sound, probably blow with great strength. On the north side of the bay is Mount Hope, a lofty, detached mass of rock, but to the southward of it lies a considerable tract of low land, over which the view is unobstructed for a considerable distance, being bounded only by a distant mountain in an easterly direction.

**Port Cook**, on the south shore of the sound, just within the entrance, is convenient and useful. It is sheltered by an island, high and wooded; the anchorage is off the rivulet on the west side, in 9 fathoms. Brookes Harbor, south of Port Cook, is spacious, but not good; the water is deep, and the anchorages, being in coves, are not easy of access. Ainsworth Harbor, 12 miles east of Brookes Harbor, has anchorage at its head on the west side. The mountains at the back of the harbor are capped by an enormous glacier that descends into the sea. Parry Harbor, 10 miles east of Ainsworth Harbor, is about 5 miles deep and 3 miles wide; at the entrance on the west side there are two coves, either of which offers a convenient stopping place for a small vessel.

**Preservation Cove.**—Stubenrauch Point is 10 miles southwest of Cape Valentyn, the northern point of Dawson Island, and south of the point is Preservation Cove, small, and with an islet off its south point affording protection for landing in most states of the weather if the wind be not west of north.

**St. Peter and St. Paul Rocks** lie 1½ miles southwest by west from Stubenrauch Point. They are about 10 feet above high water, and when joined at low water are 400 yards in extent. The ground between these rocks and Stubenrauch Point and from the latter in a northwesterly direction is foul.

**Lomas Bay**, 5 miles south of Preservation Cove, is a deep bight, bottom of stiff, blue clay, sufficiently sheltered from southwest, but quite exposed to northwest and westerly winds, which during the winter are the most prevalent.

**Port San Antonio.**—From the south entrance point of Lomas Bay the shore trends westerly 3 miles to Joachim Point, thence takes a southerly direction 1½ miles, forming Friend Bay, open and unsheltered, and at 2¼ miles south of this bay lies Port San Antonio, which has the appearance of being well sheltered, but during a fortnight that the *Adventure* was there so much inconvenience was experienced, and even risk, from the violence of the squalls that they were obliged to secure the ship with three anchors. Some difficulty

was also found in leaving the port on account of the baffling winds, as well as the narrowness of the channel (North Passage).

This port, formed by the channel between Dawson Island and the two adjacent islands of North and San Juan, is scarcely ⅓ mile across, and in it, particularly at the north end, are several islets. From the west end of North Island a reef extends ¼ mile, and to the southward there are two small islets, which may be passed on either side. North Island is separated from San Juan Island by a narrow and impassable strait.

As there are so many better anchorages on the opposite shore of the strait, this port should not be resorted to unless in great necessity.

**Tides.**—High water, full and change, at Port San Antonio is at 12h.; springs rise from 6 to 8 feet.

**Port Valdez,** at 2 miles south of Port San Antonio, is a deep inlet extending in a southeasterly direction, but is not at all inviting to enter. From the appearance of the hills, which on both sides of this port rise to an elevation of 2,500 to 3,000 feet, squalls must be very frequent and blow with great violence, for trees are seen torn up by the roots in long lines, evidently caused by the destructive force of the wind.

From Hillock Point, at 1 mile southwest of the entrance to Port Valdez, the coast trends in a southerly direction for a distance of 10 miles to Cone Point, at the entrance to Gabriel Channel.

**Magdalen Sound** extends from Froward Reach in a southerly direction, connecting with Cockburn Channel and separating Clarence Island from Tierra del Fuego. Both shores of its sound are high and precipitous, especially the west shore. Approaching from the northward it appears to be a continuation of the strait, and it is not until after passing Cape San Isidro that Froward Reach opens out. Anxious Point, the eastern entrance point of the sound, is a low, narrow tongue of land, with an island off it. Abreast this point, on Clarence Islands, there is a steep mountain, called Mount Vernal (or Summerhouse), from a remarkable lump of rock upon its summit.

**Shoals.**—Two shoals are located in the approach to Magdalen Sound, 220° from Hillock Point, distant 3½ and 6½ miles, respectively. The former has 3¼ fathoms over it, and the latter 3 fathoms.

**Gabriel Channel** is merely a ravine of slate formation, into which the water has found its way, and separates Dawson Island from Tierra del Fuego. It extends precisely in the direction of the strata, with almost parallel shores. The narrowest part is in the center. The channel at its southeastern end divides, one part leading into Admiralty Sound, the other opening into Fitton Harbor.

**Keats Sound,** on the eastern shore of Magdalen Sound, extends to the eastward for 6 or 8 miles, and is between 4 and 5 miles wide.

Southward of Keats Sound are Mount Sarmiento, described below, and Pyramid Hill, 2,500 feet high.

A patch of kelp is reported to exist about 1 mile northwestward of the south entrance point of this sound, and there are two patches near the head.

**Mount Sarmiento,** 7,330 feet high, rises from a broad base, terminating in two peaks bearing from each other northeast and southwest, and about ¼ mile apart. From the northward they appear very much like the crater of a volcano, but when seen from the westward the two peaks are in line and the volcanic resemblance ends. It is the most remarkable mountain in the strait, but from the climate and its being clothed with perpetual snows it is almost always enveloped in condensed vapor. During a low temperature, particularly with a northeast or southeast wind, it is exposed to view and presents a magnificent appearance.

**Mount Buckland,** 4,000 feet high, is a pyramidal block of slate with a sharp-pointed apex, and is covered with perpetual snow. Between these mountains the summit of the range is occupied by an extensive glacier, the constant melting of which feeds innumerable cascades which pour large bodies of water down the rocky precipices overhanging the south shore of the channel.

**Transition Bay,** 4 miles north of Cape Turn, is deep, but of little importance. At Cape Turn, the southeastern point of Clarence Island, the channel narrows to 2 miles, and the shore turns suddenly to the westward into Cockburn Channel.

**Labyrinth Islands,** consisting of two large and several small islands, lie in the entrance of a bay about 2 miles north of Transition Bay. Drew Harbor at the head of the bay is protected by the Labyrinth Islands, and has depths of 10 to 12 fathoms. North Entrance, with 13 fathoms water, lies between the northernmost of the group and a projecting point of Clarence Island. South Entrance, with 8 to 12 fathoms water, lies between Jane Island, the southernmost of the group, and the south side of the bay. Small vessels may find good anchorage among these island.

**Rock.**—A sunken rock lies about 1 mile 45° from the eastern extreme of the most northerly of the Labyrinth Islands, near a detached islet.

Vessels should pass east of the islet and give it a berth of 1 mile.

**Sholl Bay** is a small bight, 5 miles southward of Squally Point. There is a reef off it which is marked by kelp, and a rock close to Ariadne Point, the south entrance point of the bay.

At 2 miles south of Ariadne Point there is a rocky islet lying nearly in the middle of the sound.

**Stokes Inlet,** west of Squally Point, has at its entrance the three Rees Islets. The inlet extends 3 miles in a southerly direction, with

deep water; there is a cove on its north side, but it is neither as good nor accessible as Hope Harbor.

Mount Boqueron, the extremity of which is Squally Point, the east entrance point of Stokes Inlet, is a very precipitous mountain, about 3,000 feet high, having on its summit three small but remarkably conspicuous peaks. The squalls that blow down the sides of this mountain during a southwesterly gale are most furious and dangerous unless little sail be carried.

The sound here is not more than 2¼ miles wide. On the opposite shore, within Anxious Point, an inlet extends to the southeastward for 2 or 3 miles, but it is narrow and unimportant.

**Hope Harbor,** on the south side of Mount Vernal, is a convenient stopping place for small vessels passing through Magdalen Sound. The entrance is narrow, with kelp across it, indicating a rocky bed, but not less than 7 fathoms were found on it. Inside it opens into a spacious basin, with anchorage in 4 fathoms, sheltered from all winds excepting the squalls off the high land, which must blow with furious violence during a southwesterly gale.

**Rock.**—A rock with 12 feet over it, and 6 to 7 fathoms around, marked by kelp, is reported to lie near the entrance to Hope Harbor, but its position is doubtful.

**Port Beaubasin,** at the western side of entrance of Magdalen Sound, is sufficiently pointed out by the small rocky islet called Periagua, and by Mount Vernal. The outer part of the port decreases in breadth gradually to the entrance to the harbor, which is formed by two projecting points, a short distance apart, and is very shoal, the deepest water being only 2¾ fathoms. Inside, in the basin, there are 5 fathoms. It is a very snug place when once in, but possesses no advantage, since it is on the wrong side of the strait for vessels bound to the westward, as the northerly wind, which would be favorable to proceed, would prevent a vessel sailing out.

Inman Bay, Hawkins Bay, Staples Inlet, and Port Sholl are all deep inlets, surrounded by high, precipitous land.

### BROAD AND FAMINE REACHES—CAPE PORPESSE TO CAPE FROWARD.

**Laredo Bay.**—From Cape Porpesse the shore trends in a southerly direction ¾ mile to Cape Negro, on the south side of which lies Laredo Bay, the easternmost anchorage in the strait, where wood can be obtained. This bay affords a secure anchorage when there is any westing in the wind; and with easterly winds, which are uncommon, and seldom blow with violence, no danger need be apprehended if the ground tackle be good, as the depth of water is 7 fathoms, and the bottom sand and mud.

When entering keep well over to the north shore, as there is a ledge of rocks off the southern point, but Cape Porpesse should not be passed too closely, as shoal ground extends off ¾ mile in an easterly direction. There is a 15-foot patch in the center of the bay. Cape St. Vincent, seen open east of Santa Marta Island, bearing 51°, leads outside the 5-fathom line of soundings. The best anchorage is in the northwestern part of the bay, with Hawk Cliff (which will appear as the eastern extreme of Elizabeth Island) just open of Cape Negro. No tide of any consequence will be found inside Laredo Bay. Between Cape Negro and Quartermaster Island on the opposite shore may be called the western limit of strong tides in Magellan Strait.

**Caution.**—In leaving the bay a vessel should be careful to avoid the 8-foot shoal marked by kelp and reported as lying about 2½ miles 104° from Cape Negro.

**Tides.**—High water, full and change, in Laredo Bay is at 11h.; springs rise 7 feet. When to the southward of Laredo Bay the tidal streams are scarcely felt; but to the northward they are strong, and must be carefully guarded against during the night or in light winds. A vessel in mid-channel between Laredo Bay and Gente Grande Bay on the eastern shore would be set by the ebb tide, if the wind failed, directly among the dangers surrounding Santa Magdalena Island.

**Rioseco.**—Seven miles southward of Cape Negro, at the mouth of the Rioseco, is a settlement comprising a frozen meat factory and a sawmill, the buildings of which are visible from a good distance seaward. When work is going on at night the surroundings are illuminated by arc lights. Vessels anchor off the pier, protected from the prevailing winds by the high shore.

**Catalina Bay,** about 8 miles south of Laredo Bay, has no good anchorage. Just north of it there is a conspicuous white clay patch in the cliff, which is an excellent mark for determining a vessel's position. In some lights this patch looks like a ship under sail when to the nothward of it.

**Sandy Point,** the south extreme of Catalina Bay, is a low projection covered with grass, with a few trees on its inner part, and extends more than a mile from the general direction of the coast. To the northward and northeastward the water is deep close-to, but to the southeast less than 3 fathoms will be found a mile from the point.

**Beacon.**—A pyramidal-shaped beacon (refuge) 52 feet high, painted in red and white bands and surmounted by a red ball, stands on the low cliff back of Sandy Point. Near the beacon stand the masts of the radio station and the office.

**Lightbuoy.**—A lightbuoy, exhibiting a flashing white light, is moored in 4 fathoms on the eastern edge of the soal which extends from Sandy Point. Too much reliance should not be placed on it.

**Punta Arenas Road.**—A red conical buoy is moored in 42 feet of water southeastward of Punta del Rio (River Point), marking the edge of the shoal off the mouth of the Rio de las Minas.

A red mooring buoy, marked "Buque Estacion" is moored south-southeastward of the Passenger Mole, and 300 yards westward of this buoy, spaced at equal distances apart, are three mooring buoys for government vessels. Southward of these mooring buoys and westward of the Barge *Serena* space is reserved for the eight government barges which at present belong to the port.

**Light.**—A fixed red light, 26 feet above the sea level, is shown from a framework on the end of the Passenger Mole, nominally visible 6 miles. When coming from the southward at night the electric lights of the city can be seen a long distance and appear in two groups. Between these two groups is a partially obscured space in which a number of brilliant lights are scattered, and over toward its western part is the red mole light, which is at times difficult to make out. Beyond 3 or 4 miles of the port the lights of the town render the red light almost useless. Two white lights are exhibited on a coal hulk anchored southeastward of the Passenger Mole.

**Directions.**—A vessel making for the anchorage in Punta Arenas Road should not close the land until the lighthouse bears 290°, when steer for it on about that bearing and anchor in 5 to 8 fathoms. Anchorage may also be obtained in 5 to 6 fathoms farther south, with the lighthouse bearing 337°. Vessels should give Sandy Point a wide berth, and not depend upon the light buoy as marking the clearance of the bank.

In approaching Punta Arenas at night a good lookout should be kept for the numerous coal hulks anchored in the roads. The anchorage recommended for large vessels is on the edge of the 10-fathom contour, to the northeastward of the yellow barge, with the Passenger Mole bearing to the northwestward.

There are no official pilots, but experienced captains, who thoroughly know the strait, act in this capacity. The charge from Montevideo to Coronel is $390 gold; from Punta Arenas to Coronel $245 to $290.

A copy of the harbor regulations will be supplied on request.

**Anchorage.**—The anchorage is good and well sheltered from the prevalent westerly and southwesterly winds. Easterly or southeasterly gales rarely blow home to make it unsafe.

**Tides.**—High water, full and change, in Punta Arenas Road is at 12h.; springs rise 5 feet, neaps 4 feet.

**Landing.**—Besides the Passenger Mole, already referred to, there are three cargo moles, named, respectively, the Cargo Mole, the Mina Loreto Mole, and the Venteneario Mole. As the water alongside is shallow, they are available only for small vessels drawing not over

12 feet of water. When the wind is from the eastward the sea breaks over the extremities of these moles and renders landing impossible. At such times the letter "F" of the International Code is hoisted on the Government flagstaff.

A small mole, 100 yards long, is located about 100 yards northward of the dockyard.

Another mole, about 150 yards long, is located 300 yards northward of the mouth of the Ciervos River.

Of the four steam cranes, one is capable of lifting 10 tons, and the others are of lesser capacity. A railway which runs a few miles inland to the domestic coal mines has its terminal on the Mina Loreto Mole.

There are plenty of tugs and 25 lighters, and some of these are equipped and available for wrecking operations. The services of efficient divers are also available in such emergencies.

**Punta Arenas** is located on a sloping bank about 35 feet high, conforming to the general line of the coast, at the mouth of the Rio de las Minas. The residences are mostly detached, principally of wood, and are large and commodious. In the central part of the town there are fine commercial buildings of masonry, which contain well-stocked stores, where clothing and provisions are offered at moderate prices. The market affords an abundance of fish, but vegetables are scarce.

The population of Punta Arenas, in 1907, numbered 11,828 persons. The community has installed systems of modern improvements and paved its streets.

The prosperity of Punta Arenas is due to the development of the surrounding country and to the presence of gold mines, constituting a flourishing industry. This prosperity may be further attributed to the fact that it is a free port, where no duties are levied upon exports and imports of merchandise, and to the commercial benefits arising from the practice of making this a port of call in navigating Magellan Strait.

**Government.**—The civil authority is exercised by a governor, who is appointed by the President of Chile. He is assisted by two alcaldes or magistrates, and together they form a board of which the governor is president.

The military authority is exercised by a naval commandant. Punta Arenas is not a fortress, but is included in the list of the saluting ports of the navy. The station vessel returns salutes.

The captain of the port, or maritime governor, has a rank junior to the naval commandant, and exercises the authority in the bay. When it is desired to communicate with vessels in the roads, signals are made from a staff near the Government Building situated to the northward of the inshore end of the Passenger Mole.

**Meteorological stations.**—There are two observing stations maintained in the city, one by the fathers of Salesiano College, and the other at the Government building under the supervision of the maritime governor. The Salesiano station is perhaps better able to give climatic and metorological information of the region, as its observations have covered a much longer period than those of the other station.

**Banks.**—The banking houses are the Banco de Punta Arenas and a branch of the Banco Anglo Sud-Americano (Ltd.). These institutions are prepared to do all kinds of banking business.

**Hospital.**—There is one hospital supported by the charitable societies where mariners are treated. The charge per day is $2.10 gold for first-class accommodations and $1.05 for second-class accommodations.

**Coal.**—There is always an abundance of Cardiff coal on hand, which can be lightered at the rate of 300 to 600 tons a day. Night is usually the most favorable time to coal ship, as there is then less motion. A swell from the southward often rolls in, almost without warning and without apparent cause. Coaling at such times is difficult and often damaging, and it is practically impossible to land at the piers. The price of coal ranges between $12.50 and $17 per ton.

Water is delivered from water boats at the rate of 80 tons a day at the price of 60 or 70 cents a ton.

**Repairs.**—There is a patent slip for hauling up vessels of 1,000 tons, and two smaller slips, and also foundries and machine shops where welding can be done up to 9 inches, iron castings up to 6 tons, and brass castings to 3 tons. The largest length of lathe will carry 22 feet and swing 8 feet. Repairs to engines and dynamos can be effected.

**Consular officers.**—The following-named countries have consular representatives at Punta Arenas: Argentina, Austria-Hungary, Belgium, France, Germany, Great Britain, Holland, Italy, Norway, Portugal, Spain, Sweden, the United States, and Uruguay.

**Communications.**—Punta Arenas is in communication with the entire world by telegraph, via Buenos Aires, and short telephone lines connect with Dungeness and Point Delgada. Private lines connect with the Argentine colony of Rio Gallegos and with Arlington in Fitzroy Channel. A radio station is maintained here.

Steamship communication is kept up by the Pacific Steam Navigation Co., whose steamers call every 14 days carrying passengers and mail back and forth between Liverpool and Valparaiso, and whose cargo steamers also come regularly into port; by the Kosmos Line, whose steamers arrive from 11 to 14 days apart, carrying passengers and cargo outward and homeward from Hamburg to San Francisco and Puget Sound; by the Lamport and Holt Line between Liverpool

and Guayaquil, and the Merchants' Line between New York and Guayaquil; by the West Coast Line, whose steamers call once a month in passing to and fro between New York and the ports of Peru and Ecuador; and by the Roland Line, whose steamers call once a month in trading between Bremen and the ports of Peru. And, besides these distant connections, steamship communication in a more local sphere is maintained by the steamers of the Braun and Blanchard Line, which pass back and forth each month between this port and Valparaiso, calling at intermediate ports and carrying both passengers and cargo, and by steamers proceeding to Porvenir, Laredo, Zenteno, Useless, Jente, and Gregory Bays, and to Point Delgada, Espora, Rio Gallegos, Santa Cruz, and San Julian.

**Anchorages.**—Between Punta Arenas and Punta Santa Maria good anchorage may be obtained in 10 and 12 fathoms, sand and shell over clay, ¾ mile from the shore. At the edge of the kelp which fronts the shore there are depths of 5 and 6 fathoms, so that with the wind offshore a vessel may anchor close to the coast by keeping outside of the kelp. The holding ground in Freshwater Bay is good, but with Punta Arenas and Port Famine so near it is not likely to be required.

**Freshwater Bay.**—Punta Santa Maria, 12 miles southward of Punta Arenas, is the north entrance point of Agua Fresca or Freshwater Bay, and may be known by the land suddenly trending into the bay. It has also a high bank close to the beach, with two patches bare of trees. All the points to the northward are low and thickly wooded. As the bay opens, the bluff point at its southern extremity becomes visible. There is also a remarkable round hill (Center Mount), 990 feet high, a short distance westward of the bay, and a valley southward of it, through which a small river runs into the sea. This bay (the Bahia de Romay of the Spaniards) is now an offstation of Punta Arenas; the houses are situated on the slope of the south side of the valley, near the stream, and are plainly visible from seaward.

**Supplies.**—Vegetables can be readily procured from the settlers between the months of November and April; beef can always be obtained. Wood is plentiful and good for steaming purposes. Good water can be obtained from the rivulets.

**Directions.**—Rounding into Freshwater Bay from the northward, keep from ¾ to ½ mile from the coast in 10 or 12 fathoms, and having passed Punta Santa Maria, steer toward the bluff southern point of the bay until the south beach under Center Mount bears 312°, when the vessel will be clear of the kelp. The north side of the bay is foul around the edge of the kelp, and should not be approached into a less depth than 6 or 7 fathoms. Steer in with Center Mount on the above bearing, or a little southward of it, and anchor in 9 to 10

fathoms, sandy mud over clay, with the extremity of Punta Santa Maria bearing 12°, Center Mount (south pitch) 273°, and the entrance to the river 234°. A good berth may be obtained much nearer the shore in 6 fathoms, toward which the depth gradually decreases.

**Punta Carreras.**—South of Freshwater Bay the coast is bold (though a small vessel may anchor outside the kelp) and trends in a southerly direction 11 miles to Punta Carreras, which is low, but may be recognized by a sawmill upon it. Georgia Reef, extending 1 mile southeast by south from Punta Carreras, dries for a considerable distance at low water and is marked by kelp to its extremity. Cape San Isidro, seen open eastward of Santa Anna Point, and bearing 197°, leads eastward of Georgia Reef.

**Carreras Bay,** between Georgia Reef on the north and Askew Point, a conspicuous bluff, on the south side of the bay, affords a confined though good anchorage in 14 fathoms, muddy sand, off the center of the sandy beach at the head, taking care to "let go" immediately that depth is obtained, with the large house bearing 279°. Nearer to the inshore end of Georgia Reef the bottom is shelving, and a vessel would tail very close with a southeast wind. A sawmill has been maintained here for many years, and it is a convenient place to load timber, as the beach is very steep, and, excepting with easterly winds, no swell fetches on to it. As a stopping place it is not to be compared with Port Famine.

Askew Point, bearing 234°, will lead in clear of Georgia Reef.

**Santa Anna Point,** 2 miles south of Carreras Bay, has a large clump of trees on its extreme end and will be distinguished soon after leaving Punta Arenas. Mount San Felipe, 3 miles westward of Santa Anna Point, is 1,455 feet high.

**Arauco Patch,** with 5 fathoms over it, is 450 yards 138° from the extreme of Santa Anna Point.

**Tidal streams.**—All along this coast the strength of the stream is not great, but frequently, with a southerly wind, there is in the offing a set to the northward quite independent of the stream. In winter the tides occasionally rise high and overflow a considerable portion of the land immediately behind the beach.

**Port Famine** affords good anchorage on the south side of Santa Anna Point. Landing can almost always be effected (except in easterly gales) on one side or the other of the port. The Sedger River flows into the south part of the port and is fronted by a bar which dries at low water, but can be entered by boats at half tide. The water is fresh at ½ mile above the entrance. Drift timber of large size is plentiful. There are several houses on the western side of the bay, also a slip where small vessels can be repaired. A white lantern is occasionally exhibited from a flagstaff near the houses.

**Supplies.**—The fishing is variable, depending not only on the state of the tide, but also on the direction of the wind. Usually it is a very good place for hauling the seine, and the smelt are abundant and fine. Ducks and geese, with occasional snipe and plover, will also be found.

**Tides.**—High water, full and change, at Port Famine is at noon; springs rise 6 feet, the ebb setting to the northward and the flood to southward; the range is irregular, depending upon the prevalence of the wind, northeasterly and easterly winds causing high tides, while winds from the opposite directions have a contrary effect.

**Directions.**—In standing in give Santa Anna Point a berth of at least 800 yards; but if under sail only, and the wind is scant, give it a good wide berth on account of the eddy current which sometimes sets toward it. Steer in toward the head of the bay for the summit of Mount San Felipe, keeping it on over the rivulet, which will be known by a small break in the trees on the northwest end of the clear bank on the south side of the bay. The bank is conspicuous, being clear of trees and covered with grass. Keep on this course until the mouth of the Sedger River is open, taking care not to shut in the points of its entrance, anchoring in from 9 to 7 fathoms as convenient.

At night under steam a vessel will be able to feel her way to an anchorage after passing Santa Anna Point by steering 325° straight up the middle of the port, anchoring as soon as 14 or 15 fathoms is obtained. In summer the best berth is toward the west side in 9 fathoms, and in winter in the center of the bay. The strongest winds here, as well as elsewhere in the strait, are from northwest to southwest; it blows hard sometimes from the south, and occasionally a fresh gale out of the valley to the southward of Mount San Felipe. Unless the vessel be very large or a long stay be meditated, single anchor is quite sufficient, or moor with a kedge to the southeastward. The ground, though best in the middle, is good all over the port, being stiff, tenacious clay, in some places overlaid by sand.

**Voces Bay,** immediately to the southward of Port Famine, has anchorage in 7 to 10 fathoms off Second River, but the shelter is not so good as in Port Famine, and it would only be used when the anchorage in Port Famine was crowded. Second River, which has a shoal entrance, comes from some distance up the valley. Between Voces Bay and Tree Point, at 5 miles farther south, the water is too deep for anchorage, even close to the beach. At 1½ miles south of Tree Point, on the northeast side of Cape San Isidro, anchorage may be obtained in 9 to 10 fathoms, which might be useful to a vessel of small power, unable to make headway against the violent squalls which sometimes come around the cape; or for any vessel running into a fog, which sometimes, though rarely, is experienced in this locality.

**Cape San Isidro** has a low, but conspicuous, rounded hillock at its extremity, covered with trees, and forms the termination of a ridge, the summit of which is Mount Tarn, the most conspicuous mountain near that part of the strait on the west side. A rocky patch, covered with kelp, extends 400 yards off the cape, with a rock awash at high water at its outer end.

**Light.**—From a lighthouse on Cape San Isidro is exhibited, 95 feet above the sea, a flashing white light, visible 15 miles. On one occasion this light is reported to have been seen 25 miles.

The light is visible over an arc of 211° from 198° to 49°. The northern limit passes about 1¾ miles eastward of the extremity of Georgia Reef and about 1 mile off Santa Anna Point.

The small point shown on the charts just northward of the point, on which the lighthouse stands, is farther to the westward than shown and does not extend to the northern limit of the light.

The lighthouse is a cylindrical masonry tower, 26 feet high, painted white, attached to which is a keeper's dwelling with roof and cupola painted red.

**Wreck.**—A wreck of an iron vessel lies close to Cape San Isidro, but it has almost disappeared.

**Mount Tarn.**—From abreast of Elizabeth Island, Mount Tarn, 50 miles to the southward, is readily distinguished, whence it appears to be the most projecting part of the continental shore. When viewed from the northward its shape is peaked, and during the summer it has generaly some patches of snow a little below its summit, but in the winter months its sides are covered with snow for two-thirds down. From abreast and to the southward of Port Famine it appears saddle-shaped; its summit is really a sharp ridge extending nearly a mile northwest and southeast, with a precipitous descent on the northeast and a steep slope on the southwest sides. The highest part, near its northeast end, is 2,685 feet above the sea.

From Cape San Isidro the coast trends southwest about 7 miles to Glascott Point, and in the stretch are several small bays in which a vessel might find anchorage.

**Eagle Bay,** south of Cape San Isidro, is ¾ mile deep and affords anchorage at its head, but it is only useful for small vessels, steadied by warps to the shore. The williwaws at times are violent. A small reef extends 200 yards from the southwest point of the bay, and on it is an islet. Two streams empty into the bay, but the water can not be preserved long.

A whaling establishment is situated in this bay, and a pontoon is anchored in the center at the head.

**Gun Bay,** next to Eagle Bay, affords anchorage for only a single vessel near the shore at its southwestern part in 8 to 9 fathoms, stiff clay. Two rivulets, from which water can be easily procured, empty

into the bay. A round hill of moderate elevation separates it from Indian Bay.

**Indian Bay.**—From the south entrance point of Gun Bay the shore trends in a westerly direction about 1 mile to Indian Bay, and then curves round toward an islet covered with trees, between which and the shore there is only a boat passage. A rock about 12 feet high lies southeast of the islet, and either north or south of it anchorage may be obtained in 7 to 9 fathoms good holding ground, sufficiently sheltered from the prevailing winds.

The north side of Indian Bay is shoal, caused probably by the alluvial deposit from the stream nearly in the center. A patch of kelp projects 400 yards from the southeastern point, but has 9 fathoms over its middle.

**Bouchage Bay,** next south, is small and the water deep, except near the head, where anchorage may be obtained in 8 fathoms, clay.

**Cape Remarquable,** which has a precipitous round-topped bluff projection, wooded to the summit, separates Bouchage and Bournand Bays.

**Bournand Bay** is somewhat better sheltered than its neighbor from the southerly winds by Nassau Island; the anchorage is at the southwest end of the stony beach, off the rivulet, in 8 fathoms of water, stiff mud.

**Bougainville Bay,** known as Jack Harbor by the sealers, forms a snug basin, in which a vessel might careen with perfect safety. From its small size, great depth of water, and equal height of land, it is rather difficult of access, but a vessel may anchor in 12 fathoms and steady herself by warps to the trees along the sides of the cove. It is completely sheltered from all winds, and timber may be readily cut down and easily embarked. A rivulet at the head of the cove affords a moderate supply of water.

**Nassau Island** is covered with trees. Unless close to the shore, the channel between it and the mainland can not be seen, but the island may be recognized by its terminating in a point of needle-shaped rocks. When rounding Cape San Isidro, San Brigida Point, 60 feet high, at the south extremity of the island, will appear as a small island. There is little or no advantage to be gained by going through Nassau Channel between the island and the mainland, as it is so very narrow and the currents very irregular.

**San Nicolas Bay** is the best anchorage between Cape San Isidro and Cape Froward both from its depth of water, extent of anchorage ground, and its being more easily entered and quitted. It is well sheltered from winds between north and southwest. A large vessel standing to the westward will do well to stop here unless sure of reaching Fortescue Bay before dark.

Nearly in the center of the bay is Sanchez Island, small, and covered with trees, between which and the shore there is a passage of 7 fathoms. The shore is fronted for its whole length by a shoal bank, which much reduces the apparent extent of the bay. This bank extends ¼ mile from shore, its edge is steep-to, and is generally distinguished by a ripple, which, with a moderate breeze, breaks at half tide. This is not a good place for procuring water.

The best anchorage for a large vessel is about midway between Glascott Point and Sanchez, with a bottom of mud or clay. Small vessels may stand farther in to 9 fathoms, clay bottom. This berth is sheltered from all westerly winds. Vessels standing in under sail are recommended to keep plenty of sail on, in order to shoot into a good berth, on account of the high land of Nodales Peak, which becalms, and to avoid the drift of the river current, which sets over to the eastern side of the bay. It is not probable that the river current would affect a vessel when between the islet and the point.

In selecting an anchorage, care is necessary not to run in too far and fall upon the bank; but unless the southwest side of the bay is hugged closely, and as long as the outer extreme of Sanchez Island is not brought to the eastward of east by north, a vessel will be safe.

**Tides.**—High water, full and change, in San Nicolas Bay is at 50m.; springs rise 6 feet.

**Glascott Point**, the southern boundary of San Nicolas Bay, is the extreme of a high range of hills extending back for some distance. On its summit are several sharp points, Nodales Peak being the most conspicuous. From Glascott Point the coast trends in a southwesterly direction nearly straight to Cape Froward, a distance of 7 miles, the land at the back continuing mountainous and woody. Punta Sampaio, formed by a beach of shingle, covered with trees to within 20 yards of the water's edge, and distant nearly 3 miles from Cape Froward, is the only projection. Between this point and the entrance of a rivulet, which waters the only valley in this space, there is an anchorage ½ mile from the shore in 11 fathoms, which might be occupied during a westerly wind; but with the wind more southerly it would be too much exposed to be safe.

**Cape Froward** is the southern extremity of the continent of South America and lies nearly in the middle of Magellan Strait; it rises abruptly 1,200 feet above the sea. The hill which rises immediately above the cape was called by Sarmiento the Morro de San Aguedo. Mount Victoria, immediately behind, is 2,910 feet high.

**Tides.**—High water, full and change, at Cape Froward is at 1h.

**Snug Bay,** 5 miles west of Cape Froward, is an excellent berth, although the anchorage is quite open. The water from the Rio d'Oro has deposited a large bank of even, muddy bottom, which forms a good holding ground. The lead will only bring up broken shell. There is plenty of room and no williwaws.

The best berth is in 8 fathoms, about 400 yards east of Lambert Islet. There is room for several vessels to the northward and eastward of this berth, with equally good holding ground. The islet is a good guide for anchoring. The outer edge of the anchorage bank is steep-to. The easterly tide current is quite strong at the anchorage, with southwest winds.

**Wreck.**—The 3-fathom shoal about 800 yards northwestward from Lambert Island is marked by the wreck of an iron steamer.

**Tides.**—High water, full and change, in Snug Bay is at 40m.; springs rise 8 feet.

**Coast.**—The coast from Snug Bay to Woods Bay is straight and steep-to. A low-powered steamer will often be able to creep along inshore at a distance of about ½ mile, where she will find some shelter and less current than farther out, when the wind is straight down the reach.

**Cape Holland** is bold and high, and although projecting but slightly it is a conspicuous headland (darker than any land in the vicinity), as it is formed by an isolated ridge 1,125 feet high, parallel to the strait, and presenting precipitous cliffs with steps thickly covered with trees to seaward, while inland it slopes away to lowlands. There is no point to localize this cape, the cliffs being about 4 miles long and the shore nearly straight. It is steep-to, and the tidal currents strong off it. When the wind is all north of the line of the reach there is less current within ½ mile of it than farther off.

**Woods Bay,** 8 miles west of Snug Bay, and protected from the prevailing winds by the high land of Cape Holland, is a convenient stopping place. Small vessels may enter the cove at the head of the bay by skirting round the edge of the kelp that extends about 200 yards off the east extreme of the cape, but care must be taken to avoid the Esk Rock, on which the depth is only 4 feet water. The best anchorage for large vessels is in 8 to 10 or 11 fathoms, with the cape bearing 291°, distant 600 to 1,000 yards.

If proceeding to the inner anchorage, steer for the gap or lowland behind the cape, and as the south point is neared keep a hillock with a conspicuous clump of trees on it, at the inner end of the bay, in line with a remarkable peak, 1 or 2 miles behind, bearing 336°, and anchor in 17 or 18 fathoms. The bank on the northeast side of the cove shoals suddenly, and must be avoided. When the stream is running

to the eastward, a long vessel might find some difficulty in backing out clear of Boxer Spit on the north side of the cove.

**San Josef River** empties into Woods Bay and is clear for 2 miles within the entrance, beyond which it was not explored. It was then about 30 yards wide, running between banks about 15 feet high, in thick forest, and is doubtless blocked by snags a little beyond this point.

**Tides.**—High water, full and change, in Woods Bay is at 34m.: springs rise 8 feet.

**Cordes Bay.**—From Woods Bay the shore trends in a westerly direction 12 miles to Cordes Bay. In fine weather an anchor may be dropped in Andrews Bay on the west side of Cape Holland or near Cape Coventry, about 4 miles farther west, but there is no shelter from the prevailing winds. Cordes Bay may be known by Mussel Island, a small, bright green island on the east side of the entrance, and also by Mount Three Peaks, detached from the surrounding hills at the head of the bay; the westernmost and highest of these peaks is 3,700 feet. The entrance between West Point and Mussel Island is nearly ½ mile wide between the reefs; from it the bay continues a mile, but is much contracted by shoals covered with kelp. The bay has not been thoroughly examined. Temporary anchorage in 7 fathoms may be had at the entrance, with Mussel Island bearing 55° and West Point 313°.

**Port San Miguel** is a large lagoon opening from the head of Cordes Bay, running in a northeasterly direction about 2 miles, and about ⅔ mile wide. The entrance to the lagoon is not safe for vessels drawing more than 6 feet.

**Fortescue Bay** is one of the best anchorages in the whole length of the strait. It is spacious, well sheltered, easy of access, and of moderate depth. It is not advisable to anchor too close to the west side, where the williwaws are more uncertain in their direction. The holding ground also is not so good as in the eastern part of the bay.

**Beacon.**—A beacon 33 feet high, consisting of iron framework pyramidal in shape and surmounted by a ball, all painted white, stands a little inside of Southwest Point.

**Port Gallant,** the inner harbor, forms a snug little port, perfectly sheltered and with excellent anchorage in from 3 to 3½ fathoms, bottom of mud. There are only 2½ fathoms in the channel at low water, but before entering the depth ought to be verified by soundings from a boat. The banks on the western side off the east shore of Wigwam Island are but imperfectly known.

**Caution.**—Standing in for Fortescue Bay give Cape Gallant a good berth, as the western tidal stream, during springs, sets strongly toward the cape, and the same care is necessary when rounding Peterel Point if bound to the eastward, for the eastern stream sets directly toward and around it.

**Tides.**—High water, full and change, at Port Gallant is at 34m.; springs rise 8 feet. In this part of the strait, as the channel becomes narrowed by the islands, the tides are more felt and run as much as 3 miles an hour. It is reported that close inshore the stream runs contrary to that in mid-channel.

**Charles Islands,** between Fortescue Bay and Barbara Channel. consist of three principal and some smaller islands.

Opposite to Cape Gallant, and on the eastern island of this group, near its northwest end, there is a conspicuous white rock named Wallis Mark.

**Bay of the Three Passes.**—This bay is formed by the three greatest of the Charles Islands, and may be used for shelter in an emergency. There is a shoal of 2 fathoms off Jacquinot Point in mid-channel of the North Pass, and there is a depth of about 32 fathoms in the center of the bay. Vessels enter by the North or West Pass, the Southeast Pass being too narrow.

**Wren Island,** the southeastern of the group, is a small rocky islet rising abruptly in two peaks. Near it to the southeastward are the Canoas, two single rocks above water, and to the southward of the Canoas are two small islands 105 feet high. The next islands to the westward in succession are Monmouth and James Islands, with Rupert Rocks and Island. At ¾ mile southwest of Wren Island is a sunken rock.

**Rupert Island—Light.**—An unwatched flashing white light is exhibited on the northeastern side of Rupert Island, English Reach.

The light is shown 62 feet above sea level from a cylindrical iron tower painted red and white in horizontal bands, and is visible 12 miles over an arc of 179° between the bearings 136° and 315°, being obscured by the land of Charles Islands southward of the bearing 315° and by the land of Carlos III Island southward of the bearing 136°.

The height of the tower from base to focal plane is 7½ feet.

**Passage Point,** the east entrance point to Elizabeth Bay, is 8 miles westward of Cape Gallant. The 12-foot shoal off this point is well marked by kelp.

A rock with a depth of 2 fathoms over it lies with Passage Point bearing 343° distant about 490 yards.

**Caution.**—It is reported that Passage Point extends with submerged isolated pinnacle rocks farther to the southward, in the channel of the reach, than shown on the chart. Therefore, in passing this locality vessels should give the point a good berth.

**Elizabeth Bay** has a fair anchorage about ½ mile from the eastern beach, in from 13 to 16 fathoms, sandy bottom. In easterly winds it is a very good anchorage, but it is open to the prevailing winds, which, however, do not throw in much of a sea. There is a remark-

able bare patch on a hill over the anchorage, which, when coming from the westward, shows conspicuously, and should not be brought to bear eastward of 89°, the line which clears the rocky ridge extending off from a low point ½ mile west of the anchorage.

The tidal streams are not strong in the eastern part of this bay, but they develop quite a strength in the western part, where there is an indifferent anchorage in 14 or 15 fathoms near the edge of the kelp, about 250 yards from the beach.

**Wreck.**—The wreck of a steamer lies on the shore of this bay in front of the boldest part of the land.

**York Road,** 5 miles west of Elizabeth Bay, is off the mouth of the Batchelor River. As the tides set strongly through both Crooked Reach and Jerome Channel, a vessel lying here in light winds will be sheered about most uncomfortably, and in strong winds it is subject to violent gusts down both these channels also; but for these objections there would seem to be a fair anchorage in 10 or 12 fathoms, sand and mud, with Batchelor River seen well open. When anchoring or leaving the roads care must be taken to keep the river's mouth well open until at least ½ mile offshore from the west point of the bay, as very shoal water extends a considerable distance from the point. With Elizabeth, Tilly, and Borja Bays so near, York Road is not recommended.

A rock awash marked by kelp, lies about 200 yards from the eastern shore of York Road, with Little Bonet Island on the south shore of the strait bearing 252° and Batchelor River entrance 350°.

**Batchelor River.**—There is a depth of 6 feet in the entrance to the estuary of the Batchelor River. Within the estuary there is a depth of 13 feet, the channel lying nearer the western shore. The estuary terminates in a narrow river, which drains the waters of Lake Caballero. The total distance from the sea to the head of the lake is 6 miles, and the lake is only 3 miles distant from Wickham Bay in Otway Water.

**Tides.**—High water, full and change, in York Road is at 2h.; springs rise 9 feet. The set and change of the stream in this part of the strait are uncertain on account of the meeting of the waters of Jerome Channel with those of the strait through English and Crooked Reaches, which occasions many ripplings. The streams run about 3½ knots an hour. There is an eddy all along the north shore of the strait in this part.

**Cohorn Island—Light.**—An unwatched flashing white light, visible 10 miles, is exhibited on Cohorn Island, Crooked Reach.

The light is shown 35 feet above the sea from a cylindrical tower 7 feet in hight, painted red and white in horizontal bands, surmounting a skeleton steel structure 19½ feet high, and shows over an arc of 170° from 317° to 127°.

**Craster Rocks.**—One of these rocks lies with the Cohorn Island light bearing 329° and the mouth of the Batchelor River bearing 90°, and the other lies 250 yards, 348° from it. The least depth over them is 21 feet.

**Anson Rock,** a dangerous pinnacle, on which the depth is 18 feet, with deep water close-to, lies well out in the strait about 4 miles west of York Road in the bend north of Cape Crosstide. It is small in extent, and is marked by kelp, which shows only at slack water, as it is run under by the tide.

The south extreme of Borja Island, in line with the nick in Cape Quod bearing 277°, leads south of Anson Rock.

**Buoy.**—A red conical buoy, with the name "Anson" on it in white letters, is moored close westward of Anson Rock.

**Carlos III Island,** separated from Ulloa Peninsula by David Sound and joined to Rupert Island by a reef called Lucky Ledge, is high and covered with trees. The cove to the northward of Whale Point, the southeastern extremity, has an anchorage in 15 fathoms, but the holding ground is very bad.

**Mussel Bay,** on the northeast shore of the island, is of considerable size and well sheltered, but the bottom is uneven and stony and the water deep. Dessant Rocks, with 1 fathom over them, lie about 600 yards off the eastern point. A shoal, with 3½ fathoms over it, lies 1,050 yards 276° from Dessant Rocks; another, with 9 feet over it, lies 850 yards 285° from the Rocks. Another shoal, with a least depth of 9 feet at low water, lies 200 yards 57° from the 3½-fathom shoal, and mariners are counseled to navigate here with caution, as other shoals are believed to exist in this bay.

**Bonet Islands,** the highest of which is 136 feet above the sea, lie 2½ miles westward of Mussel Bay off the north shore of Carlos III Island. A shoal of 4 fathoms lies about 400 yards west of the larger Bonet Island.

The neighborhood of Bonet Islands is not adapted for anchorage, as there is no shelter and the water very deep, added to which the tidal streams between the islets are very strong.

**Tilly Bay,** 1 mile east of Cape Crosstide, is very conveniently placed for a vessel unable to stem the strong currents and violent squalls which often come with great force through Crooked Reach and sweep around the north end of Carlos III Island. It is the first opening east of the cape. A moderate-sized vessel must anchor in the middle of the bay or a little farther in, where 18 to 20 fathoms, bottom of mud, will be found. When entering this bay great care must be paid to the helm, as the currents set strongly across the entrance. In this bay, as in many others of the western anchorages of the strait, there seem to be points of rocks projecting up through the mud.

**Tides.**—High water, full and change, in Tilly Bay is at 1h. 30m.; springs rise 6 feet.

SOUTHERN SHORE—MAGDALEN SOUND TO CAPE PILLAR.

**Clarence Island,** on the south side of Froward Reach, extends from Magdalen Sound to Barbara Channel; and the whole length of its northern coast is indented by sounds stretching deeply into the island.

**Lyell Sound** penetrates 9 miles into Clarence Island to the westward of Greenough Peninsula, and is separated from Port Sholl by a ridge of hills only 1½ miles wide. In the entrance of the sound are two conspicuous islands, though one of them is very small, called the Dos Hermanas. Kempe Harbor, 1½ miles within the entrance of the sound, on the western side, is rather difficult of access, but perfectly secure. Stokes Creek, on the same side and more to the southward, also offers good anchorage, but, from its being out of the way, can be of no utility.

**Mazareda and Cascade Bays** are of less size, and therefore more attainable, but of the same character as Lyell Sound, viz, deep water surrounded by high land. The latter is known by a cascade from which it derives its name.

**Hidden Harbor,** at 1½ miles westward of Cascade Bay, has a narrow entrance, but if required offers a good shelter. It is not safe for vessels drawing over 10 feet. Just before opening into the harbor a ridge of rocks dries nearly across at low water, leaving to the north a passage 70 yards wide, thick with kelp, and with 2¾ fathoms as deepest water in the center.

**Pedro Sound** extends in a southerly direction for nearly 13 miles, and has two inlets branching off into the land to the westward, and, to the eastward, Acwalisnan Channel, with a depth of 5 fathoms in the narrows, joining this sound with Dyneley Sound. There is a small anchorage on its western side 1½ miles within the entrance, called Murray Cove, and another close to it, which is even more sheltered.

Murray Cove is not fit for vessels more than 120 feet long. It is deep to the head, where there is anchorage in 16 fathoms, but a large kelp patch contracts the swinging room.

**Freshwater Cove,** at 4 miles westward of Pedro Sound, is a confined and indifferent place.

**Bradley Cove,** on the western side of Bell Bay, is a very convenient anchorage. It bears west-southwest from Taylor Point, the entrance point on the east side of the bay, and will be known by a small, green, round hillock that forms its north head. The anchorage is in 17 fathoms, and the vessel may be hauled in by stern fasts or a kedge into 9 fathoms in perfect safety.

**Pond Bay,** on the west side of Bell Bay entrance, has good shelter, but is too confined for anything but small sealing vessels.

**Mount Pond,** 2,500 feet high, is a conspicuous double-peaked hill, and is visible from the eastward as soon as it opens off Cape Froward; the mount has a double summit, only one of which is visible from the eastward.

**Simon Bay,** 5 miles west of Pond Bay, is studded with islands and rocks. To the southward it communicates with Barbara Channel on both sides of Burgess Island. The easternmost of these channels, named Toms Pass, is tolerably large, but, from the irregularity and force of the tides, it is not to be preferred to the more direct passage through the Shag Narrows on the western side of Cayetano Island, for there is no good anchorage in St. Michael Channel (which leads to it, between St. Michael Point and Cayetano), and it is bounded by a steep and precipitous coast. Gonzalez Narrows, on the western side of Burgess Island, is not more than 30 yards across, and, from the force of the tide and the fall of the rapids, would be dangerous even for a boat to pass.

**Shipton and Mellersh Coves,** on the eastern side of Simon Bay, are both surrounded by high land, and the depths being great, neither of them afford anchorage. Off the head that divides them are the Castro Islets, on the north side of the largest of which there is a convenient cove with a moderate depth of water. In the Castellano group there are five good-sized islands; they lie in the center of the bay, but possess no anchorage.

**Miller Cove,** on the east side of Cayetano Island, at about 3 miles southward of Elvira Point, the north extreme of the island, is the only good anchorage in Simon Bay. It has three rocky islets off its entrance and a conspicuous mount on its eastern point. The anchorage is in 5 fathoms, good bottom, and entirely sheltered. Wood and water are plentiful.

**Port Langara,** the next opening south of Miller Cove, is rather more than a mile long, ⅜ mile wide, and trends in a northwesterly direction. The water is deep, excepting at the head of the port and in a cove on its northern shore, in either of which there is good anchorage. At the former the depth is 8 fathoms and in the cove 5 fathoms.

**Choiseul Bay,** situated 5 miles northwest of Barbara Channel, does not seem to be in the least inviting. It is a large, deceptive bay, full of islets and patches of kelp, under which there are rocks, while between the islets the water is deep and unfit for anchorage. Nash Bay, 4 miles to the northwestward, is equally unserviceable.

**Whale Sound,** on the south side of Ulloa Peninsula, is the first opening west of Nash Bay, and runs westerly 8 miles, terminating in a valley bounded on each side by high mountains. There is

anchorage only in one part of it, on the western side of Last Harbor; and although this harbor appears large, the anchorage is small and close to the shore. Whale Sound is too far out of the way to be of use to the navigator.

**Galiano Bay,** 3 miles west of Whale Sound, has at its entrance a rock with a depth of 2 fathoms over it; and about 1 mile 291° from this rock is another rock having over it a depth of 2 feet.

**David Sound,** between Carlos III Island and Ulloa Peninsula, has in its northern part deep water, but in the narrow part of the sound there are depths of 10 to 30 fathoms, and possibly an anchorage. In a passage like this, however, between high land the squalls would be violent and anchorage unsafe.

**El Morrion (The Helmet),** on the Ulloa Peninsula shore, at 3½ miles of Cape Crostide, is a granitic rock 1,100 feet high, the outer face of which is perpendicular, bare, and of a light-clay color. It may be distinguished for a considerable distance from the westward and forms an excellent landmark. El Morrion is remarkable also for a large white patch on its face.

**Light.**—A fourth-order, unwatched, flashing white light has been established on El Morrion. The light is shown 79 feet above the sea from a cylindrical iron tower 7 feet high, painted black and white in horizontal bands, and is visible 14 miles over an arc of 171° from 92° to 263°.

**Crooked Reach** is comprised between the entrance of Jerome Channel and Cape Quod.

**Butler Bay** is one mile west of El Morrion Light and easily accessible to small craft. The anchorage is near the west shore of the bay over a rocky plateau covered more or less with mud, where vessels are sheltered against the surf and wind. Fresh water may be obtained from a cascade behind the low hills which border the south coast of the bay.

**Chance Bay,** the next opening west of Butler Bay, looks like a good place at first sight, but the rocks and islets at the west end are all joined by kelp, being, in fact, a continuation of rocky ledges, rendering the anchorage unfit for a vessel of any size.

**Mass Bay** is very deep. It shares also in the objection to other bays on the south side of this reach, that they are exposed to the full force of all the winds down Long Reach.

**White Bay** has an anchorage in 15 fathoms, mud, for small vessels; it is perfectly secure.

**Long Reach** extends from Cape Quod to Havannah Point, 36 miles in a northwesterly direction. The weather in this reach is frequently so thick that, although the distance across it is only 2 or 3 miles, one shore is found concealed from the other by the mist; but

the rain squalls often blow along the land when it is comparatively clear in the middle.

There is less rain with the wind from the southwest quarter than when it is from the northwest, but it is very capricious.

A clear, bright morning is usually followed by a stormy and wet day, the change generally setting in before noon.

Although such weather is common in all the western parts of the strait, and perhaps in Long Reach more than in the others, the navigation of a steamer presents little difficulty on this account. The high land is commonly obscured, as well as the points at a distance of 2 or 3 miles, but they can almost always be seen sufficiently far off to avoid running on them, and between the driving squalls a view is generally obtained for some distance. The shores on either side of this reach are less verdant than to the eastward of Cape Quod. The hills are generally bare of all vegetation above, but below they are covered with trees and shrubs, though not of large size.

**Snow Sound,** on the south shore of Long Reach, is of no importance to the navigator; it ends in two arms surrounded by high, perpendicular black rocks.

**Swallow Bay** is 1¼ miles westward of Snow Sound. The anchorage is under the eastern side of Carteret Island, which separates Swallow and Condesa Bays. On the west side of the entrance is Fitz-Roy Rock, which covers some time before high water, and lies about 200 yards off Carteret Island, but between this and the Wallis Islets the passage is clear. After entering, the kelp marking Fisgard Rocks will be seen 400 yards eastward of Duntze Point, nearly in the middle of the bay, and may be passed on either side, the anchorage for large vessels being about 300 yards inside them. A smaller vessel will find anchorage off Grant Point, or even farther up the bay.

The drawback to Swallow Bay is that the bottom is one of the rockiest in the straits and the grinding of the cables excessive, and in consequence it is not recommended.

Swallow Bay may be easily recognized by a large cascade falling down from the center of the mountains at the head of the port, to the southward of which there are two higher mountains, the summit of the eastern being peaked and the western one rounded. Coming from the eastward it will be recognized as the next opening to Snow Sound. The passage inside Carteret Island between Swallow and Condesa Bays is full of large bowlders, and is only navigable for boats.

Quantities of fish may be taken with a net in the small coves at the head of the bay.

**Condesa Bay** has not nearly so much room in it as Swallow Bay; the anchoring ground, obstructed by islets and rocks, is suitable for small vessels only.

**Stewart Bay,** at about 1 mile westward of Condesa Bay, is so much obstructed by rocks as to be useless to large vessels. A patch of 2 fathoms lies nearly in the center of the entrance. It is not to be recommended as an anchorage, for, though it is sufficiently sheltered from wind and sea, yet the rocks in different parts of it render the passage in and out very hazardous. Every danger in it is pointed out by rockweed, but it is so much narrowed thereby as to require the utmost vigilance.

**Cape Hunter,** about 3¼ miles west of Stewart Bay, is the east entrance point of Snowy Inlet. It has a rock to the north of it close to shore.

**Snowy Inlet** extends 13 miles into Santa Ines Island; it takes a direction 157° for the first 6 miles, then 246° for 1 mile. then 190° for 6 more miles. Its termination is in a large bay, very deep in all parts, yet near its head anchorage may be found in three coves, the one in the eastern part of the bay being preferable.

On the west coast of Snowy Inlet, 1½ miles south of Havergal Bay, is a bay ½ mile wide by 1 mile deep, the south shore of which is a peninsula extending 2 miles to the westward. One the east coast are several shallow coves with moderate depths of water, but none of them are recommended as anchorages on account of the squalls which may be expected in them.

A little over 3 miles up the western side of the inlet there is a large glacier, which descends from the snow field surrounding Mount Wharton, 4,350 feet high, to within 150 feet of the sea level. It marks Havergal Bay.

**Havergal Bay** is divided into two parts by Arthur Island. There is anchorage in both the West and East Bays, but the latter is by far the better. West Bay, being the larger, was first used by the *Sylvia*, but experience showed that heavy williwaws occurred from opposite directions, so that if anchored on the flat of 10 fathoms it was necessary, when allowing room for swinging, to have the anchor so near the edge of the deep water that the bight of the chain was liable to catch when the vessel was sheering about. The flat is composed of muddy sand over loose stones, and did not seem good holding ground.

The water in the other part of this bay is inconveniently deep, but there is stiff mud between the rocks at the bottom and the anchor will hold well.

**Yacht Bay,** a cove in the West Bay, is too small for anything larger than a schooner, and the holding ground is not overgood. A small leg of the glacier comes down a gulley in the cliff southwestward of Yacht Bay, and the stream from this has pushed forward a flat delta, which spoils the bay.

**East Havergal Bay.**—Good anchorage was found in this bay in 22 fathoms, stiff black mud, with no rocks, and though the squalls also change their direction here from north to south, they were not so heavy as those in the West Bay, more immediately under the cliffs of Mount Wharton. There is not much room to spare, but the wind always blows either in or out of the bay. It is, for a moderate-sized vessel, a far better anchorage than Swallow Bay, and it is well worth while turning down for a couple of miles to pass a quiet night if possible. A large vessel should go to Field Anchorage on the opposite shore.

The entrance, nearly 200 yards wide, has a little kelp on the island side, off Johnson Point, which is low.

The anchor should be dropped with Ling Point in line with the summit of Moraine Hill bearing 210° and Let-go Point in Yacht Bay seen just over the low isthmus in the center of Arthur Island bearing 305°.

Care must be taken to anchor in the right spot, as if too far up the cable will catch on the edge of the shoaler rocky ground.

With the wind northward of west in the strait, the squalls in Havergal Bay will be from the northward; when well south of west they will come from about south, and for the points immediately about west the williwaws come from the north and south indiscriminately.

**Chink Creek,** the western entrance of Snowy Inlet, and Humphrey Cove, 1¼ miles west of the inlet, are of no importance.

**Radford Hill** is a conical mound and stands near the shore. Stella Island is farther up the coast, to the east of which is a small bight of no importance. It might afford anchorage for a small vessel; rocky bottom.

**Arathoon Bay,** 4½ miles westward of Snowy Inlet, and nearly opposite to Glacier Bay on the northern shore of Long Reach, has two arms, the western of which contains no anchorage. The eastern arm extends southward for 6 miles, terminating, beyond Marsh Basin, in another basin with depths too great for anchoring.

The entrance to the bay is wide and clear. Keep in mid-channel until near Doyle Point, the eastern point of the peninsula which separates the arms of the bay, then keep over toward this point in order to avoid a 1-fathom rock, marked by kelp, which lies 400 yards eastward of the point.

**Marsh Basin—Anchorage.**—In approaching Marsh Basin avoid the kelp which extends ¼ mile off Drew Point. Henry Point, at the entrance to the basin, is clear; the entrance is 300 yards wide with 11 fathoms in the middle.

March Basin is 1 mile long and ¾ mile wide, and is surrounded by lofty mountains from which descend extensive glaciers. The water

is very deep except in the southeast corner, where there is anchorage in 10 fathoms, rocky bottom, and not very extensive.

The best position for letting go is with Steele Islet clear of both points of the entrance to the inner basin, bearing 149°, and White Rocks, off the eastern shore of the anchorage, bearing 85°.

**Volage Bay or Bates Cove,** to the eastward of Abra Channel, is available only to small craft. It is long and narrow and appears perfectly sheltered. The high mountains which border the bay rise nearly perpendicularly, which is an indication that the banks are steep and the entrance clear. In 1883 the French ship *Volage* anchored in 13 fathoms in about the middle of the bay. A narrow passage leads from the bay to the cove at its southern end, where there is excellent shelter. A creek, or rather a cascade, flows from a small lake back of the bay and empties into the cove.

**Sea Shell or Abra Channel,** 2 miles west of Arathoon Bay, connects Magellan Strait with Otway Bay and the Pacific Ocean. An incomplete examination by the *Sylvia* showed it to be a fine navigable passage, but no anchorages were found. It may possibly be of service to a vessel embayed in Otway Bay, enabling her to run into the strait. Abra Island, which stands in the center of the eastern entrance, is 300 feet high and covered with vegetation. The entrance is 2 miles wide, but it soon narrows to ¾ mile.

**Rock.**—A rock with a depth of 1½ fathoms on it, and well marked with kelp, lies in the fairway of Abra Channel, with center of Maycock Island bearing 305°, distant ¾ mile, and summit of Francis Island 32°.

**Village Point,** at the west entrance of Abra Channel, so called on account of a collection of Fuegian wigwams in the little bight just to the west, is a fine, bold headland.

**Rocky Inlet,** 3¾ miles west of Village Point, is narrow, 1¾ miles long, and at the bottom of an open bay formed by the projection of Casper Point. It is not recommended as an anchorage—vessels must moor here to be safe, and the williwaws are strong up and down the channel. Also, with Playa Parda Cove, 6 miles to the eastward on the north shore, and Port Angosto, 8½ miles to the westward, it would be preferable to choose one of these anchorages instead of Rocky Inlet.

Ellen Islet, small and rocky, lies 1,200 yards south from Casper Point facing the entrance of Rocky Inlet, and at the same distance eastward of Ellen Islet is shoal ground with two rocks awash at low water. A vessel entering Rocky Inlet should pass north of both Ellen Islet and these rocks.

Harry Point, the north entrance point to Rocky Inlet, has kelp off it for more than 200 yards, to which a berth must be given. After passing Harry Point the channel is quite clear.

The anchorage at the head of Rocky Inlet is 300 yards wide, the depth of water where the anchors are dropped 17 and 13 fathoms, gravelly mud and shell.

The bight between Casper Point and Harry Point is too deep and rocky for anchorage.

**Underhill Bay,** 3 miles west of Casper Point, has no anchorage in it. The cove on the north shore inside the island would do well enough for a schooner, but is rocky and too small for anything over 200 tons.

**Cormorant Inlet,** at 1½ miles west of Underhill Bay, is a large, straggling sheet of deep water, with no anchoring ground for a vessel larger than a sealing schooner, except in Mostyn Cove, at 3 miles within.

**Mostyn Cove** appears to be a very fair anchorage, but very little is known about it. To reach it, steer mid-channel into the inlet south of Wellard Island, and after turning to the westward keep on the north shore, to avoid a large patch of rocks and kelp in the center of the inlet. The entrance is narrow, and kelp is found on both sides, but 6 fathoms was carried in and out by the *Sylvia* on two occasions. Though kelp lies off all the north shore inside, the opposite side is clear, and there seemed to be plenty of room to swing when at anchor.

Pritchard Islands are a group of small islets lying at the entrance of Cormorant Inlet. Sealers anchor under the island and in a little bay west of Grave Island, but in both places on foul ground.

**Lewis Bay,** just west of Cormorant Inlet, runs in a westerly direction under Mount Possession. It is too deep and small for anchorage.

The coast for 2 miles to Port Angosto is much broken up and indented, but no bay is large enough for anchorage except Brooke Cove, which would give good protection to a small craft.

**Port Angosto** affords good anchorage, with room enough for a large vessel, but for small craft it is not so comfortable as Playa Parda Cove. As regards williwaws, there is not much to choose between them, as with gales from certain points the squalls are very heavy in both places. The bottom is rocky and uneven, having stiff clay in the interstices, in which the anchor holds well. In ordinary winds the puffs come from all directions, and the anchor may become very foul if a vessel remains.

When it is quiet it is perhaps better to lie with a short scope, to avoid fouling, but if puffs commence the cables should be at once veered as much as the vessel's length will allow, as the williwaws are quite strong enough to bring heavy strain on the gear.

Port Angosto's weak point is to the south, and consequently it is winds from south of west that find their way in. The north shore

of the harbor is so precipitous that no wind can come from that direction, consequently in bad weather a ship will always lie with her head to the southward or southwestward, and care must be taken when anchoring not to let go too soon. During winter the head of the port is frozen over.

Thin streamers of kelp grow up from rocks in 9 fathoms for some distance west of the thick mass springing from the shallow water off Hoy Point.

The south waterfall is always conspicuous and is fed by a lake of considerable extent.

The best mark for Port Angosto is Mount Possession, a conical mountain 1,635 feet in height, nearly separated from the ranges behind by a dip at the head of Lewis Bay, and which generally stands well out in front of the other land. It is immediately to the eastward of Port Angosto, and a large beacon stands on its summit.

**Beacon.**—A rectangular, pyramidal, skeleton iron tower, lower half red and upper half white, surmounted by a staff carrying a rectangular, pyramidal topmark, painted red, stands on Entry Island, at the northern entrance point of Port Angosto. The topmark is elevated 30 feet above ground, and 59 feet above the sea.

**Directions.**—When entering Port Angosto, steer a mid-channel course. Kelp, with a rock awash in it, extends 100 yards southeastward of Entry Island, a small, moss-covered islet on the north side of the entrance. Kelp also extends off Wise Point, the south entrance point. On passing Passage Island the large waterfall will be seen. This is the southern of the two cascades marked in the plan (the other is sometimes a mere trickle), and on rounding Hoy Point can be steered for on a bearing of 241° for the anchorage in 15 fathoms. A cast of 8 fathoms may very likely be got just before arriving on the spot, and if the anchor is being eased down, care must be taken that it is not lowered too far before this ridge is passed, or the anchor may catch.

The anchor should be placed as nearly as possible in the position indicated on the plan. A bearing of the second projection south of Hoy Point, a smooth, low piece of rock, will be found convenient to check the position for bringing up. When the anchor is let go, Hoy Point should be in line with the south extreme of Passage Island.

In the winter months ice forms in the interior harbor to an extent rendering the free handling of vessels impossible.

**Tides.**—High water, full and change, is at 0h. 40m.; springs rise 4 feet.

**Half Port Bay** is a small indentation 1 mile west of Port Angosto and immediately east of Canoe Inlet.

**Canoe Inlet** is very deep until the hammer-shaped head is reached, but the entrance to this, east of the island that nearly blocks the

passage, is very narrow, and the basins inside are too confined for anything but a small vessel. The western basin is barred by rocks and kelp; the center one has a rocky bottom, but the eastern one, having a muddy bottom in 6 fathoms, would be good for small craft, were it not for the fact that it is too far from the strait, and the probability of heavy williwaws.

**Davis Point** has a rather remarkable conical-shaped mossy hill at its extremity, 125 feet high. A rock awash and surrounded by kelp lies about 200 yards to the northward and eastward of the point.

**Indian Inlet,** the next opening, is deep and useless to navigation.

**Byron Bay,** under Cape Monday, is too confined for other than small schooners. They will find shelter by anchoring close under the cape. The bottom is rocky and a kelp patch with 5 fathoms lies 300 yards west of the islet off the eastern point.

**Cape Monday** is a bold cape forming the western limit of Long Reach. The flat summit of the ridge which forms it and which drops abruptly to the sea is 925 feet high.

**Sea Reach,** forming the western portion of Magellan Strait, runs northwestward and southeastward for 58 miles. On the northern shore, between Capes Tamar and Philip, it opens into Smyth Channel, and thence by other channels into the Gulf of Peñas. In a heavy gale or strong breeze a short sea may be experienced in the wider parts of the strait, especially westward of Cape Froward, but on opening Sea Reach a heavy swell will be met coming from the Pacific. This will be found to a certain extent even on the calmest days, and with strong westerly winds it becomes a serious drawback, giving, however, a good indication of what may be expected outside.

It has been remarked that the southern side of Sea Reach is the more rainy.

**Medal Bay** is a small port 1 mile west of Cape Monday.

It has a small island at the entrance which forms two channels, the easternmost of which is only deep enough for boats, but the western is 25 fathoms wide. It is strewed halfway across with kelp, but between the kelp and the island is a very narrow passage of 6 fathoms. In the kelp is 3 fathoms, and inside the port the depth is 9, 8, and 7 fathoms, sandy bottom, with 4 fathoms at the sides.

The port is semicircular of about 300 yards in diameter, and therefore too small to be of service to modern vessels, to say nothing of the narrowness of the entrance.

At the bottom of the bay which lies between Cape Monday and Medal Bay is a similar but still smaller haven, with an entrance just wide enough to admit a boat.

**Cordova Island,** 4 miles west of Cape Monday, at the entrance to Cordova Inlet, is 715 feet high, and rocky. On its northern point is a remarkable hillock named Conway Knob.

Luiz Cove, a two-armed bight in the north shore, is deep and useless as an anchorage.

**Cordova Pass,** leading eastward of Cordova Island into Cordova Inlet, is ½ mile wide at the entrance, narrowing to ¼ mile at the south point of the island.

A small islet lies a little to the eastward of mid-channel, and some rocks beyond it are still nearer the eastern shore at the narrowest part.

Anchorage may be found off a neck near the south point of Cordova Island in 19 fathoms, but the bottom is rocky and the bank steep, and in all probability it would be a dangerous place.

Kelp lies off the south point of Cordova Island, but there are 20 fathoms in mid-channel.

**Cordova Inlet,** a wide and long sound trending to the southward, is 1 mile wide at the entrance, but narrows to ½ mile 3 miles inside, again widening to the southward.

It is very deep, and the western shore is indented by bays, but they are all unfit for anchorage. The inner part has not been examined.

**Baker Cove** appears well sheltered and serves as a harbor, but is anything but a quiet one, for the entrance facing the northwest lets in the furious gusts from that quarter, and once in they seem quadrupled in force, so that it can not be recommended but may, perhaps, afford a berth to some belated small vessel.

The entrance is 1 mile south of Cordova Pass on the east side of Cordova Inlet, and is about 100 yards wide, with an abrupt wall of cliff on the south side. On the north is also a steep mountain side, but two short low points form the actual coast line.

A ship should moor, on account of the liability to foul the anchor more than from want of room, dropping the first anchor in the center of the basin in 14 fathoms, with the entrance points just touching, and the other toward the head of the cove in 10 fathoms. With southwesterly winds the gusts are from the north, being deflected by the mountains. With a strong west-northwest wind it would not be agreeable for a stranger to run in through the narrow entrance with the wind aft.

**Williwaw Bay,** on the west side of Cordova Inlet, 5 miles within the entrance, has two arms inclosed by steep and lofty mountains. It is not a safe anchorage.

**Upright Bay,** between Cordova Inlet and Cape Upright, at 2½ miles west of it, is to be avoided. The bottom is rocky and irregular, and several patches of kelp with rocks in them were found in it.

**Port Upright** is at the head of Upright Bay, and having a bad entrance, deep water, and rocky bottom, can not be considered a fit place for a vessel.

**Delusion Bay,** on the eastern side of Upright Bay, is too deep to be of use.

**Cape Upright,** a flat-topped and square-faced headland, 880 feet high, is the termination of a promontory which separates Cordova Inlet and Wallis Sound. Several islets and rocks lie around it.

**Sentinel Island,** 52 feet high, is small and rocky, and lies 700 yards east of Cape Upright.

It shows just clear of the cape to a vessel approaching from either an east or west direction when on the south side of the strait. Foul ground extends 200 yards from the island.

**Light.**—From a red frame tower, 15 feet high, on Sentinel Island, is exhibited, at 69 feet above the sea, an unwatched, flashing white light, visible 10 miles over an arc of 194°, from 112° to 306°.

**Ildefonzo Bay** is an indentation on the north face of Upright Promontory, and is ¾ mile across. A line of rock runs out from its center, terminating in Midge Rock, 10 feet above high water and 600 yards outside the west point of Ildefonzo Bay.

It is not fit for anchorage.

**Alquilqua** is the name of the bight included between Cape Upright and Santa Casilda Point. The shore is much broken up and indented, with rocks and islets off it. Off them the tidal currents cause much rough water and ripplings, and this, combined with the fact that the wind generally draws in toward the shore, makes it an undesirable locality.

**Coughtry Islands,** west of Upright Promontory, are mostly low, but one rises in a rounded hill to 165 feet. They are from ½ to 1¼ miles offshore, with rocks awash off their seaward face.

**Wallis Sound** runs into the land to the southeastward from the eastern part of Alquilqua Bay. The sound has two bays on its western shore, but they are too deep to be of service, having also rocky bottoms and patches of kelp.

A patch of rock which nearly always shows or breaks lies midway between the Coughtry and Chapman Islands, in the fairway into Wallis Sound.

**Chapman Islands** cover a space of 2 miles in the western part of Alquilqua Bay. They are generally about 100 feet high, and on the Strait side seem steep-to and clear of danger.

**Port Uriarte,** at the western end of Alquilqua Bay, from the entrance being narrowed by a rock in the middle and from the amount of kelp scattered about in it, is not to be recommended.

**Santa Casilda Point** is low, but immediately backed by a steep mountain.

**Puchachailgua** is one of Sarmiento's Indian names, and is apparently identical with Cordova's Canal de la Tempestad. It is a long, narrow, and deep inlet, and is quite useless.

**Echinique Point,** at the western entrance of Puchachailgua Inlet, is backed by precipitous mountains.

**Port Santa Monica** is a small port with a very narrow entrance. A boat or small schooner drawing not more than 6 feet can enter it, and once inside, will be in a small basin with 7 fathoms of water.

**Port Churruca,** 12 miles westward of Cape Upright, is surrounded by high mountains with bare precipitous sides. Mount Hart-Dyke, 3,500 feet high, at 4 miles westward of Port Churruca, is covered with snow, and when abreast the port, if clear, one of the glaciers from this will be seen high in the mountains overhanging one of the creeks of the port on the western side, with Mount Campbell, a very sharp peak 2,544 feet high, just to the left of it, and up the inlet of Churruca.

Mount Cunningham, 2,542 feet high, in the first line of mountains on the eastern side of the entrance, is also a remarkable sharp peak as seen from the north and east, and is further to be distinguished by another peak of almost the same shape and height a mile to the eastward of it.

The grandeur of the scenery in the inner basins is scarcely to be surpassed, but the gloom caused by the height of the precipices, the color of the bare slate rock, and the almost continual pall of cloud that rests on the higher peaks is most depressing.

The port is more than usualy rainy, and frequently it is enveloped in mist and rain. Nassau Anchorage has a little more space than is found in Port Tamar. Reports from various officers who have of late years visited Port Churruca recommend it as an anchorage, and state that it is to be preferred to Port Tamar. Oldfield Anchorage is very cramped, and should the williwaws be long and strong, there is scarcely room to swing.

When there are bad williwaws at one anchorage the other enjoys immunity from them, and there doubtless are many days in which a calm will prevail at both anchorages.

Passing in mid-channel through the entrance, Diegues Island, off the outer point, will be seen on the starboard beam, and Diaz Island, off the first inner point, a little on the starboard bow. Carranza Islands will be ahead, and the channel west of them, through the first narrows, will not open until nearly abreast Diaz Island. A little farther, Casilda Island, small, will be seen in mid-channel, and should be left to starboard. The first inner basin will now open, with Oldfield Anchorage on the port hand and a long arm lined with cliffs to starboard. Continue a south course, and passing through another narrows 300 yards wide, Nassau Anchorage, the second inner basin, is reached. Holland Point, the west entrance point, has a shoal with 15 feet over it extending nearly 100 yards into this entrance.

**Nassau Anchorage** has a very uneven rocky bottom. After bottom is obtained with the lead the anchor may be placed near the position marked on the chart, but it is almost impossible to say what depth may be found. The height of the cliffs to the south and west will make that shore seem much closer than it really is.

The islet north of Digby Point, just showing west of the latter, is a good line, and a bearing of one of the points leading to the Lobo Arm will check the distance in. The eastern part of the anchorage is very deep.

**Oldfield Anchorage** is at the east corner of the first basin. A vessel should steer in on an east course for the south point of the bay and anchor in about 18 fathoms when the point on the starboard beam bears about south. There is not room for a large vessel at this berth on a squally day.

**Tides.**—It is high water, full and change, in Port Churruca at 1h. 0m.; springs rise 6 feet.

**Darby Cove,** about ¾ mile west of Port Churruca, has a rocky bottom, judging by the amount of kelp in it. It is not large enough for anything but a small craft.

**The coast** west of Port Churruca is for 2 miles broken into a succession of bays, with low, rocky promontories between them. None of them afford shelter to large vessels.

**Wodsworth Bay,** 4 miles west of Port Churruca, is similar in plan, though on a smaller scale, and with no anchorage worth much mention. Its entrance is ½ mile wide.

The highest waterfall in the main strait, 1000 feet, falls into Wodsworth Bay, and is visible from the strait.

**The coast** west of Wodsworth Bay is fronted with islands and rocks for 2 miles, one of the latter being ½ mile from the shore.

**Felix Bay,** under Felix Point, is large, but open to prevailing winds, and, from the kelp in it, of a rocky bottom.

**Felix Point,** 8 miles west of Port Churruca, shows well on approaching from either side. It makes as a ridge with two peaks on it, the southern being the higher; the other, just above the point, is 630 feet high. Rocks and foul ground stretch off Felix Point for 400 yards.

**Light.**—A flashing white light, elevated 95 feet above the sea and visible 17 miles, is exhibited from an iron tower with red and white horizontal bands and green cupola, erected on the largest and most easterly of the four islands located to the eastward of Felix Bay. The keeper's dwelling is white with a red roof.

**Felix Cove,** to the southward of the island on which the light stands, affords good anchorage, with protection from local winds, in 12 fathoms of water, rocky bottom.

**Valentine Harbor,** at 6 miles west of Felix Point, has a narrow entrance between kelp-covered rocks, and the anchorage very confined. Hauling round Cape Valentine, there are some islets extending ½ mile from it, with several rocks off them, which, however, are all marked by kelp.

**Cape Cuevas,** about 2 miles northwestward of Cape Valentine, is the extremity of an island close to the shore, and about 450 feet high. To the eastward, between the two capes, the coast forms a bay studded with islands, while to the westward it is broken into several small bays.

**Truxillo Bay,** at 3 miles west of Cape Cuevas, is the first good anchorage west of Port Churruca. It is well sheltered, but has deep water rather near the shore, and did not seem so good as Tuesday Bay, which is close-to.

**Tuesday Bay,** the next bay westward of Truxillo, is well sheltered, and easy of access for medium-sized steamers, though the entrance is rather narrow for a sailing vessel to work in. Cape Cortado, which may be said to form its western entrance, is unmistakable and marks the port well.

Vessels proceeding westward should not pass Tuesday Bay without a certainty of well clearing the strait before night, as it is the westernmost safe port, and only 13 miles from Cape Pillar.

There is a passage on either side of Nodales Islets, a cluster surrounded by foul ground in the middle of the entrance, but that to the northward is the straighter and better of the two. These islets are 36 feet high, and will be seen for some distance outside, and The Quartermasters off the north entrance point always break. The best berth for a large vessel is in 20 to 22 fathoms on the south side of the bay, and for small craft, in Christmas Anchorage, between the kelp at the western extremity, in front of a small sandy beach. The holding ground is not good.

**Rocks.**—A rock with 4¼ feet of water over it, marked by kelp, lies 1,000 yards 22° from Nose Point, and about 135 yards from the north shore of Tuesday Bay.

In 1904 the steamer *Albuera*, drawing 22 feet, struck on a rock 1,000 yards 29° from Nose Point.

**St. Joseph Bay,** in the southern part of Tuesday Bay, is a well-sheltered anchorage, but it is very deep except close to the shore. The best anchorage is in about 20 fathoms, bottom rock and mud, near the head of the bay, about 600 yards 233° from Nose Point.

The Chilean gunboat *Magallanes* found secure anchorage here, and the force of the wind very much less than in Tuesday Bay, while the strain on the cable was not nearly as great.

**Tides.**—High water, full and change, in Tuesday Bay is at 1h.; springs rise 6 feet.

**Tuesday Cove,** immediately outside Tuesday Bay, is well sheltered and might do for sealers, but is altogether too small for anything larger.

**Cape Cortado** is a perpendicular rock well deserving its name. It is quite steep-to. This cape is unmistakable going either way along the southern shore, and if a vessel is far out in the strait a remarkable needle mountain, over the head of Tuesday Bay, marks it well.

**Coast.**—From this point to Cape Pillar the coast the whole way is foul and dangerous. Rocks above water extend off Port Mercy to a distance of 2 or 3 miles, and a wide berth should therefore be given. Going to the westward from Tuesday Bay a vessel should not steer westward of 326° until she has passed Port Mercy; and coming from sea should be very careful not to get down on the southern shore. If the land be visible, Cape Cuevas should be kept outside Cape Cortado, or Cortado never brought to bear eastward of 146°. After passing Port Mercy, Cortado will show as a near extreme, and Cape Cuevas, though really an island, as said, shows like a promontory joined to the mainland by a low neck, over which will be seen another point which projects beyond it.

**Hamilton Head,** 2 miles west of Cape Cortado, is an abrupt cliff headland. It is similar in profile to Cape Cortado, but not quite so perpendicular. It is much higher, and, projecting farther into the strait, shows as the extreme when seen from the eastward unless very close to the shore, Cortado being to the left. Coming from the west, the latter is more conspicuous.

**Skyring Harbor,** 3 miles west of Cape Cortado, is perfectly sheltered when once inside, but there are several rocks off its entrance and it is very narrow and confined. Having got in there on one occasion in the *Nassau* during a heavy gale, great difficulty was experienced in getting out again, owing to the limited space and the fury of the williwaws.

**Port Mercy.**—At 3½ miles westward from the western point of Skyring Harbor is Mercy Head, the eastern point of entrance of the harbor of that name. This port, the Puerto de la Misericordia of Sarmiento and the Spanish Harbor of Wallis, is the most dangerous harbor in the whole strait and one to be carefully avoided. When once inside the port the anchorage is fair, but the off-lying dangers are such as to render its entry extremely hazardous.

With such a good harbor as Tuesday Bay within 9 miles no vessel is justified in going into Port Mercy.

In 1857 the Chilean Government sent the steamer *Maria Isabella* to relieve the crew of a bark which had been wrecked here, and the steamer was also wrecked in the entrance. H. B. M. S. *Sutlej*, in February, 1863, having got in safely, was almost lost inside. Still later, in 1869, the P. S. N. Co.'s steamer *Santiago* was lost on a rock

outside those marked on the chart of that time, and on which the *Nassau* narrowly escaped being lost a fortnight before. Should circumstances, however, render it necessary to enter this dangerous place, abreast the first bight round Misericordia Point is as good a berth as any other.

Here, as in many ports, it will not be found advisable to get too close up to the weather corner of the harbor with a view of being sheltered from the strength of the squalls, as they are usually less felt when a little farther off.

**Rock.**—A pinnacle rock, marked by kelp, with a depth of less than 6 feet, is situated in the approach to this port, in a position from which the eastern entrance point bears 180°, distant 2 miles; this rock is surrounded by deep water.

**Shoal.**—At 3 miles 25° from the eastern entrance point is a shoal with 3¾ fathoms over it.

**Tides.**—High water, full and change, at Port Mercy is at 1h. 22m.; springs rise 4 feet.

**Cape Pillar,** the south point of the western entrance of Magellan Strait, is a high cape showing from the eastward as a double nipple.

See also under "Directions—Eastward."

CROOKED, LONG, AND SEA REACHES—NORTH SHORE—JEROME CHANNEL TO WESTERN ENTRANCE.

**Borja Bay.**—From St. Jerome Point the shore trends westerly 4 miles to Borja Bay, which may be known by Big Borja or Despair Island, off the west entrance point of the bay. The anchorage is sheltered from the westerly and southwesterly gales which usually prevail, and is open only to southeasterly winds, which very rarely blow here, and still more rarely with violence. No surf or swell obstructs the landing anywhere, and there is plenty of wood and water. A number of boards with ships' names upon them will be seen on the eastern side of the bay near a rivulet, and these form a good mark for picking up an anchorage by not bringing them eastward of 77°. The shores of the bay may be approached to 100 yards close to the edge of the kelp. The williwaws are at times very heavy, but they need not be feared, as there is no sea and the holding ground is excellent. A vessel over 300 feet long occupies nearly the whole of the bay when swinging.

As vessels nearly always ride head to the northward of west in this bay, long ships find little difficulty in backing out into the strait.

**Directions.**—In a long steamer, stand in slowly, midway between Isabel Point and Despair Island, steering 319° for the head of the bay, until Little Borja Island opens well out westward of the largest of the eastern low-lying groups of Ortiz Islands bearing 201° (the

vessel's bow will then be in 14 or 16 fathoms and the stern in 24), when the anchor should be let go, veering to about 75 fathoms, on account of the sudden gusts.

**Tides.**—High water, full and change, in Borja Bay is at 1h. 15m.; springs rise 5 feet.

**Crooked Rock,** between Borja Bay and Cape Quod, has 3 feet water on it, with 4 to 6 fathoms at the distance of 100 yards on its east and south sides. It is marked by kelp, but vessels running during the night, or by day in thick weather, should keep well over on the southern shore where no danger exists. From the center of this rock, the north extreme of Little Borja Island (distance 1,400 yards) is in line with south extreme of Big Borja Island, bearing 77°. The summits of the Borja Islands in line, bearing 60°, lead about 400 yards eastward of the rock, and Beware Island, seen well open south of Cape Quod, leads south of it.

**Buoy.**—Crooked Rock is marked by a red conical buoy with the name "Crooked" on it in white letters, and surmounted by a red conical topmark, moored close northward of the rock.

The coves Bahia de Cisneros (Swan Bay) and Ancona de Tamasco, between Borja Bay and Cape Quod, are not suitable anchorages.

**Cape Quod,** 2 miles west of Borja Island, is 800 feet high, and is unmistakable when coming from the eastward; but when from the westward at night or thick weather, care must be taken not to mistake False Cape Quod for it. The capes are very similar, but Cape Quod has a small island, named Beware, 25 feet high, about ¼ mile west of it.

**Barcelo Bay,** the next opening west of Cape Quod, has no safe anchorage. The west part is too small, and has a kelp patch nearly in the middle, while the east part is open and deep, having 25 fathoms close in among the kelp, and too close to the beach to be of any use. The easternmost part of all has a sandy beach at its head, but it is quite exposed.

**Osorno Bay,** about 1 mile west of Barcelo Bay, is of no service, being too deep, as well as open to all westerly winds.

Osorno Islets, the highest of which is 15 feet, lie about ¼ mile off the western entrance point of Osorno Bay.

**Langara Bay,** the next to the westward, is small, and the bottom is muddy sand over rocks; it can not be recommended even as a stopping place.

**Lion Sound,** at 1¼ miles west of Langara Bay, extends 2½ miles in a northeasterly direction, and terminates in a small basin, in which there is a depth of 12 fathoms.

**Arce Bay,** the next opening west of Lion Sound, is ⅓ mile across the entrance and nearly ½ mile deep, with 6 to 18 fathoms water.

On the east side of the bay an arm extends in a northeasterly direction ¼ mile, near the entrance to which lie two small islands.

**Good Luck Bay,** ¾ mile west of Arce Bay, affords anchorage in 15 fathoms, but the holding ground is not good, and there is no shelter from southerly winds. A small islet lies off the west point of the bay, to which it is joined at low water. Foul ground marked by kelp extends southeastward of the islet.

**Vallena Cove,** at 2 miles north-northwestward of Good Luck Bay is exposed to the southwest. It has not yet been examined for anchorage. With the usual winds it is under the lee of Cape Notch, and possibly a ship might anchor there.

**Guirior Bay,** between Vallena Cove and Cape Notch, extends 2½ miles north, and is about 1 mile wide. There is no possibility of anchoring, except in the bight at the extreme head, off a low waterfall, that is visible as a white spot from the strait. Here, northward of a patch of kelp covering a 1-fathom rock, is a muddy bottom at 26 fathoms, but there is not room for any but the smallest craft. The deep passage is to the eastward of the kelp.

**Cape Notch** is very remarkable when passing either way. A perpendicular mass of rock 590 feet high rises from the shore on the side of the ridge forming the peninsula, from which it is separated by a deep notch. The shore of the cape is steep-to.

**Skinner Islets,** 1½ miles northwestward of Cape Notch and ¼ mile offshore, are four in number, and little more than rocks. A sunken rock marked by kelp lies 300 yards westward of them.

**Pauline Bay,** between Notch Peninsula and Hill Point, is so foul and rocky that it would be most unadvisable to anchor. At the bottom of this bay, northwestward of the peninsula, is the entrance to Notch Cove. Chope Island, 80 feet high, is in the center of the bay, and being covered with thick moss and grass always shows green. The peninsula northwest of the island is high and rocky and shows like an island from all directions.

**Notch Cove** is a most perfect Harbor for small vessels, but the entrance is somewhat intricate; it is not therefore suitable for a mere stopping place for the night, but in case of repairs being necessary to a vessel not over 230 feet in length it is probably the best place in the western part of the strait.

**Directions.**—Between Collins Island and Haylock Island is a passage 200 yards wide, but the navigable channel is but 80 yards wide, with 6 fathoms least water. In passing through, keep clear of the kelp which marks the edges of the shoals on both sides.

Having passed these narrows, a deep basin about ½ mile in diameter will be entered; across its northern side extends a chain of islets to the eastward of which and adjacent to Point Debono lies the second narrows 200 yards wide. There is no anchorage in the first basin.

Channel Rock, with 2 feet of water over it at low tide, lies nearly in the center of the second narrows. It does not show and generally has no kelp on it, though 4 or 5 fathom places in the channel are marked by kelp. The rock is very small, with 5 and 6 fathoms water close to it all round. The shore on the eastern side is fairly steep-to, and kelp marks the limit of about 4 fathoms very well.

It would be advisable for a stranger to anchor a boat on Channel Rock before attempting the narrows.

The passages between the other islands are shoal.

Standing on: When the eastern extremity of Westley Island bears about north a small wooded island (Max) will open out inside the narrows. On the peninsula behind it are several rounded hills, the highest of which, Dome Hill, 156 feet high, may be readily distinguished. Beacon Mound, the next summit to the right of and a little in front and lower than Dome Hill, kept in line with a remarkable white patch on a low cliff at the water's edge bearing 350°, will lead eastward of Channel Rock in 5 fathoms water. Dome Hill, kept a little open of the right extreme of Max Island, will also clear the rock.

When Levy Point is abeam, steer for the passage between Max and Westley Islands, which is quite clear.

After passing Max Island keep a little to starboard to avoid a rock 70 yards off the middle of Lally Island, and then steer mid-channel, rounding Proctor Point in the same manner, when the harbor will open out. Anchor in the center of the cove in 12 fathoms, mud bottom, with Maunder Point bearing 133°.

Kelp, with shoal water, stretches offshore a little north of Proctor Point, which is avoided in a mid-channel course.

**Tides.**—High water, full and change, in Notch Cove is at 1h.; springs rise 5 feet.

**Hill Point,** between Pauline and Glacier Bays, is steep and bold.

**Glacier Bay** is an indentation 1¾ miles deep and about ¾ mile wide. Rock Island, bare, divides the bay into an inner portion, which is very deep, and therefore useless, and an outer bay, Field Anchorage, which affords a good berth to a passing vessel.

**Field Anchorage** affords a large area of anchoring ground. Some small islands lie in the middle toward the northwest shore, and between them and the southern side is a smooth sand and mud bottom, with from 6 to 12 fathoms water. It is quite easy of access, there is plenty of room, and the holding ground is good.

It is open to the southwest, but no sea rolls in, and the absolute immunity from williwaws makes it as quiet an anchorage as any in the strait, but even here care should be exercised and plenty of scope given, as large steamers sometimes drag their anchors.

Little Point, in line with the summit of Rock Island, on a bearing 72°, leads in clear to the anchorage. The anchor should be let go on this line when the rocks to the south of Hat Island are in line with the west extremity of Boyce Island, bearing 348°. An old cable chain, probably with anchor attached, lies on the bottom just 100 yards 250° of the anchor marked on chart as the best position for anchoring.

On entering, the first depth will be about 6 or 7 fathoms for a distance of 400 yards, when it will suddenly deepen to 12 fathoms as the anchorage place is reached. An inside berth in 12 fathoms is better than one farther out, as it is more protected and the holding grounder is stiffer.

**Ginn Cove,** about 4 miles north-northwestward of Field Anchorage, is small and affords no shelter. A deep ravine extends back into the hills from Ginn Cove, up which the lower part of a glacier may be seen. The range at the back of this part of the coast is crowned with perpetual snow and culminates in Mount Wyndham, 4,000 feet high.

**Playa Parda Cove,** the entrance to which lies 1¼ miles northwest of Ginn Cove, has an inner anchorage landlocked and well sheltered, but very confined, with depths of 5¾ to 6¾ fathoms, mud. Many winds pass harmlessly overhead, leaving the cove in perfect calm, but, like all the landlocked harbors, it has its weak points, and cases have been known of the williwaws being furious and from all directions. It should not, therefore, be used by a vessel over 180 feet in length unless absolutely necessary.

When the winds inside are light they are from different quarters, but it is not necessary to moor for one night only; and as a steamer will have her fires banked another anchor can always be dropped where required.

Middle Point, on the east side of the cove, just within the entrance, is steep-to, and should be kept aboard when entering, the opposite side being rocky and more shallow.

The east entrance point to the inner anchorage is also steep-to, and should be kept aboard to avoid Svetland Rock, a pinnacle nearly in mid-channel, with 16 feet on it, 25 and 27 feet close-to, and 6½ fathoms between it and the eastern point of entrance.

The width from shore to shore here is only 80 yards, and the navigable passage 40 yards for vessels that can not pass over Svetland Rock.

**Anchorages.**—The outer anchorage, south of Middle Point, is very rocky and should not be used. The inner anchorage is in about 6 fathoms, with Wooding Point on the west side of the entrance, or the rocks awash north of it, seen well open of the eastern point of the narrows.

**Caution.**—Care should be taken not to anchor too far in the inner anchorage, as a rock with 4½ feet of water over it lies 100 yards 36° from the position of the anchor on H.O. Chart No. 264.

**Tides.**—High water, full and change, in Playa Parda Cove is at 1h. 8m.

**Playa Parda Inlet** extends from just west of the entrance to Playa Parda Cove in a northwesterly direction 2 miles and is ⅓ mile wide, with deep water throughout. The sandy beach, with flat land behind at the head, looks as if it should be fronted by shallow water, but the water is, on the contrary, deep to within 100 yards.

**Shelter Island** is conspicuous. Standing well out from the land on the west side of the entrance of Playa Parda Inlet, it has a well-marked summit 385 feet high, and is covered with vegetation.

There are depths of 19 to 42 fathoms close around the island, but the channel north of it has not been sufficiently examined to be certain that it is clear of danger.

Turtle Rock, above water, lies nearly ¼ mile from the northeast side of the island, and a rock nearly awash, buoyed by kelp, lies 600 yards from the northwest point of the island.

**Marion Cove,** 1½ miles west of Shelter Island, is very small, but is well protected. The water is so deep that there is scarcely room for even a small vessel to veer enough cable to be safe. The bottom is irregular and rocky, with depths from 24 to 30 fathoms, where a vessel might anchor.

**Star Cove,** 1½ miles west of Marion Cove, is useless as a port, being too small and much encumbered by rocks.

**Pollard Cove,** 3 miles westward of Star Cove, is also too narrow and steep for an anchorage. It is 1½ miles long and 400 yards wide, running into the land in a northeasterly direction.

**Cape Cooper Key,** just westward of Pollard Cove, is rounded, so that from abreast it can not be localized, but it appears a conspicuous, bold headland when approaching it from either way, and more especially from the eastward, after rounding Cape Quod. it will be visible in clear weather as the apparent termination of Long Reach.

**Light.**—An unwatched flashing white light is exhibited on Cape Cooper Key from a cylindrical iron tower, 7 feet high, painted red and white in horizontal bands. The light is 106 feet above the sea, and is visible 12 miles over an arc of 183°, from 312° to 135°.

From about Star Cove the hills assume an even more desolate aspect than before. A little westward of Cape Cooper Key the hills on the shore line dip to a comparatively low peninsula, which forms Bell Bay.

**Bell Bay** is too deep and rocky for an anchorage.

**Hannant Bay,** just west of Bell Bay, has deep water all over it. At the head of this bay sealing vessels anchor among the kelp, but nothing larger can use it.

Among the rocky summits northeastward of Hannant Bay there is one crag, Dark Knob, of a distinctly darker tint than the others, whose general color is a light gray.

**Black Rock,** just awash at high water, lies ¼ mile offshore off the west point of Hannant Bay, and is marked by kelp. The west end of Santa Anna Islands kept open of the extremity of Havannah Point will clear it to the southward.

**Havannah Point,** the northwestern limit of Long Reach, is a sloping point of bare white rocks. A rock awash lies close to the shore off its southwestern extremity.

**Santa Anna Islands,** in the entrance to the Gulf of Xaultegua, have their shores steep-to and appear free from dangers; they are composed of bare and very white granite. Their summit is 890 feet above the sea.

**Blaxland Island,** a small rocky island partly covered with moss, is between the Santa Anna Islands and Havannah Point. It is 100 feet high and steep-to on the west side, but rocks extend a short distance from its east and northeast sides.

**Muñoz Gamera Peninsula (King William IV Land)** forms the north shore of Sea Reach. It presents a succession of high, jagged peaks over 3,000 feet high with deep ravines and precipitous cliffs. There are several inlets, but all are too deep and narrow to be of any service.

**Richardson Island,** the largest and most conspicuous of a group lying off Muñoz Gamera Peninsula, is 1¾ miles long, and is mostly low, but has two hills. The southern, 325 feet high, appears conical from the east. The northern is a square-topped hill, 380 feet high. The island is everywhere covered with deep moss with low tangled trees on the sheltered sides. Islets and rocky shoals extend 1 mile in a southeasterly direction from the island, but the latter is marked by kelp.

**Cripples Channel** is the passage between Richardson Island and the mainland. It is useful for a low-powered vessel that can not contend with the wind and sea, so often found in Sea Reach.

It is the beginning of a smooth-water route to Port Tamar, passing north of Providence Island. The channel, 3 miles long, has an average width of 600 yards, but is only 300 yards wide in the narrowest part, which is quite clean and deep. At the eastern end there are many kelp patches off either shore, but these are all visible and can be avoided by keeping a mid-channel course.

The water is too deep for convenient anchorage, but the *Sylvia* rode out a heavy gale anchored in 35 fathoms, with the north hill of

Richardson Island bearing west. The wind was steady without squalls. The kelp patches southeast of Richardson Island are the principal dangers to be avoided, and approaching from the southeastward, the left part of the northern hill of Richardson Island (square-topped) in line with Webb Point bearing 317°, will lead up clear. When abreast the islets southeast of Richardson Island keep mid-channel.

There is a 4-fathom patch, marked by kelp on the south shore of the narrows, but by keeping in mid-channel it is easily avoided.

**Maze Islands,** northwest of Richardson Island, with an unnavigable channel between, are, as their name denotes, a labyrinth of islands and rocks. A conical hill, 220 feet high, rises at the eastern end. The remainder of the group are low, especially at the western part.

**Big Island** is a rocky mass 670 feet high, 1 mile north of Cummins Point, the north point of Cripples Channel.

**The Inshore Passage,** northward of Cripples Channel, is between Pike and Vince Islands. Off the western extreme of Vince Island is a rock 80 yards from the shore; otherwise the passage, ⅓ mile wide, is deep and clear.

**Northbrook Sound** is a deep fiord, running between the mountains for 10 miles to the east-northeastward and terminating in a picturesque basin, into which the streams draining a large glacier, which descends to within ¼ mile of the shore, discharge themselves.

This glacier is fed by the same snow field that supplies those stretching down to Glacier and Icy Sounds, at the head of Beaufort Bay. No anchorage was found in Northbrook Sound.

Another smaller inlet, unexplored, trends east by south, having its entrance east of Big Island.

**Providence Island,** about 1½ miles west of Maze Islands, is 4½ miles long north and south and 4 miles across the north side, between which and the mainland is Sylvia Channel. It is mountainous, and when seen from the strait appears as an undulating ridge with several peaks on it, the highest of which is 1,510 feet above the sea.

**Cape Providence,** the south extreme of Providence Island, is a bold headland with deep water close-to on the east side, but a small rock lies about 200 yards from the shore, a short distance west of the cape, and will only be seen from the eastward when the south extreme bears west of 311°.

**Celery Island,** 32 feet high, small and moss covered, lies ½ mile from the shore, with Cape Providence bearing 240°.

**Providence Bank.**—From Celery Island for 1½ miles to the south a rocky bank of foul ground extends, with two (and possibly more) rocks nearly awash on it.

To pass southward of Providence Bank, Jones Peak, on Tamar Island, must be kept well open south of Cape Providence, bearing nothing to the westward of 311°.

To pass eastward of Providence Bank, Brown Point, the northwestern extreme of Maze Islands, in line with York Hill, a conical eminence 1,000 feet high at the eastern extreme of Providence Island, bearing 18°, will lead east of the bank until Cape Providence bears 292°, when the course can be altered to port to clear Brown Point.

The passage between the Maze Islands and Providence Bank may be useful to vessels unable to reach Port Tamar before dark, as, if necessary, anchorages may be found under Providence Island at the risk of the loss of an anchor, or a course may be shaped for Sylvia Channel.

**Anchorage.**—On the eastern side of Cape Providence the water is very deep and the shore bank is steep and rocky. A vessel can anchor in several places close under the land, but there is no room to swing, and the williwaws are exceedingly heavy, though the water is perfectly smooth.

Anchorage under Providence Island is not recommended. For a moderate-sized vessel the anchorage in Sylvia Channel is much to be preferred.

**Sylvia Cove,** on the eastern side of Providence Island, 2½ miles from Cape Providence, is ¾ mile deep and but little over 200 yards wide. It afforded protection to the *Sylvia* while her boats surveyed the vicinity, but, moored as she was, there was not room to swing in all directions. It is not fit for a vessel more than 150 feet long.

Fairway Rock, 3 feet above high water, and surrounded by kelp, lies in the center of the entrance, and can be passed on either side, but the eastern passage is the better, for then the course is straight 326°. Shallow water extends some distance south, and a patch of 2 fathoms extends 100 yards north of Fairway Rock.

**Sylvia Channel,** 5 miles long, is the passage between the mainland and Providence Island, and is the continuation of the inshore route. It is 250 yards wide at the narrows and has an excellent anchorage for a moderate-sized vessel, clear of rocks, and with no williwaws. Though the mountains are lofty, they slope gradually to the shore, and the land immediately on either hand is, for the strait, low.

The eastern entrance is partly blocked by a cluster of small islands (Passage Islands), having a deep channel to the northward of them. The highest of these has a well-marked summit, which will be easily made out when approaching from Cripples Channel or from the southward.

**Entrance Islet** is the eastern one of the Passage Group. It is 70 feet high and steep-to, forming with the mainland the commencement of the channel, here ½ mile wide.

**Coombes Rock** is a small rounded knob of granite 2 feet above high-water mark. It lies 150 yards from the south shore and 700 yards 303° from Weston Point, with kelp and shoal water extending 150 yards to the northward and westward of it. A mid-channel course is easy to keep and will clear all dangers.

At Hayes Point the land on the north side opens into a large bay full of islands, and at the low western end of Providence Island a number of islands continue the southern shore of the channel.

**Ward Island,** the western limit of this channel, has a group of rocks not more than 12 feet high about 200 yards to the westward; they can be rounded within 200 yards. This island is covered with moss and stunted trees.

**Channel Peak** is a conspicuous object on the mainland near the west end of the channel. It is an isolated conical mountain, 1,450 feet high. There is another mountain of similar shape, but higher, to the northeast of it, with a deep dip between them.

**Anchorage.**—The anchorage in Sylvia Channel is in the narrow eastern part, in from 15 to 17 fathoms water, bottom of gravel, stones, and mud. It is on the southern side of the channel, 450 yards 336° from Coombes Rock. If clear, Channel Peak ought to be seen a very little open of Poulter Point. There is a stream on the south shore which usually shows as it trickles down the hillside in a small cascade. This should bear about 218° when the anchor is dropped.

Although there is not much room to swing to the westward, it is very improbable a vessel will do so, except in a calm, when with a slack chain the ebb stream may cause her to do so.

The *Sylvia* was anchored here on several occasions and in all sorts of weather, and found it one of the best berths in the strait; no williwaws, very little jerking of the cables, and the wind steady in direction.

They found that generally the current ran strongly to the eastward, but in calm weather the tidal stream made itself felt, and sometimes set in the opposite direction. The turning of the stream did not seem always to agree with the time of high water, and doubtless it is much affected by winds which may be blowing in the main strait while it is calm at the anchorage.

**Coast.**—The coast from the west end of Sylvia Channel to Port Tamar is much broken up and is faced by innumerable islets, rocks, and kelp patches. The land is lower, but rises in one place to a height of 1,170 feet.

**Sullens Rock** is marked by a large patch of kelp. It is an impediment to the free navigation of the channel. It lies 292°, distant about 800 yards from Ward Island.

**Steed Rock** is a patch of 2 fathoms marked by kelp about 1 mile 232° from Sullens Rock. It is midway between the west shore of Providence Island and the mainland.

**Directions.**—A vessel may pass either east or west of the above rocks, but it is advisable to keep east, especially in thick weather.

After rounding Ward Island and the rocks off it, the west point of it kept bearing 46°, right astern, will lead eastward of Steed Rock until Round Island is in line with the summit of Beloe Heights, above Port Tamar. The course may then be changed so as to bring Cape Tamar a little on the starboard bow.

**Tamar Peninsula.—Monson Bay** is a bight on the eastern shore of this peninsula; it is quite large and might afford good anchorage, but it is too far out of the way.

**Round Island,** 260 feet high and 3 miles east from Cape Tamar, is readily known by its haycock shape and white patch on the south side. Its steep sides are covered with thick bushes. As foul ground extends off this island for some distance, give it a berth of at least 1 mile.

**Fricker Island** is somewhat similar in appearance to Round Island; but as it is higher and quite close to the shore, there ought to be no difficulty in discriminating between them.

**Coast.**—The bay northward of Fricker Island was not thoroughly examined, as neither the approach to it, nor the bay itself, seemed to offer any inducement to spend time on it with Port Tamar so close.

West of Round Island, a line of shoal patches, marked by kelp, extends to Port Tamar, some of which are ¾ mile from the shore. There appears to be a passage inshore of these from Round Island, but it was not examined closely, as it would be of little service. Vessels entering Port Tamar should pass west of these shoals.

**Port Tamar.**—Reports from various steamer captains describe this anchorage as a very bad one and only to be used in case of absolute necessity, while Port Churruca, on the opposite shore, is highly recommended. It is on the south side of Tamar Peninsula and there is no difficulty in entering. Unless the wind is very far to the south no sea will enter Port Tamar; in the latter case the amount of sea is very insignificant.

**Beloe Heights** have several small summits on them, the highest, 735 feet high, being marked with a beacon. The hill over Cape Tamar is rounded and 840 feet high. When seen from the eastward the peaks of Tamar Island will tower above Tamar Peninsula, but Beloe summit will show on the sky line just to the right.

**Mouat Islands** will generally be visible from a distance of 3 miles. The one with the observation spot is the highest, 40 feet high, and covered with vegetation, the larger one to the west being only 15 feet in height. Dolphin Island is a bare rock and shows well.

There is a sandy beach at the western part of the bay, a very rare thing in these parts.

**Directions.**—Approaching Port Tamar from the eastward, care must be taken not to close the land too far east of the port, on account of the Perceval and other reefs; as these are, however, marked by kelp, there is no real difficulty to be apprehended.

There is a remarkable white vertical patch, resembling a tombstone, about one-third of the way up the green side of the hilly land at the western part of the port. This patch, in line with the eastern of the Mouat Islands bearing 308°, leads southward of all dangers, and when John Point bears 4° steer for it on this bearing, leaving the 4½-fathom patch west of Dolphin Island on the starboard and the 2½-fathom patch on the port hand.

These rocks are marked by kelp, the latter having a large mass on it, which can be rounded moderately close.

**Caution.**—Do not mistake the white spot on the cliffs inside of John Point for the tombstone patch.

**Anchorage.**—The best anchorage is in 15 fathoms, with the tombstone patch seen north of Spencer Island, and bearing 280°, and Sentry Island shut in by the large Mouat Island. Stiff clay lies in the hollows between the rocks. Do not drop the anchor in less than 15 fathoms.

There is a second berth northwestward of the Mouat Islands for small vessels, but it ought not to be used if there is room in the other part of the bay.

**Tides.**—High water, full and change, in this part of the strait is at 1h. 40m. The rise in Port Tamar is 6 feet, and a little less in Port Churruca.

The flood stream sets to the eastward and attains a velocity of about 1½ knots an hour. The stream of the ebb is not so strong, but when against the wind there are overfalls and ripplings southward of Tamar Island.

**Tamar Island,** off the west side of Tamar Peninsula, and separated from it by Rhoda Pass, has two peaks visible in clear weather from abreast Arathoon Bay on one side and Cape Pillar on the other. The southern, Taylor Peak, is square and flat-topped, 1,380 feet high. The northern, Jones Peak, has a sharp summit and is 1,405 feet high.

Rocks and islets skirt the shores of Tamar Island for 1¼ miles off to the south and at ½ mile to the west. Falgate Island, the highest, is 60 feet above water.

**Astree Rock,** the outmost danger off Cape Tamar, has 16 feet water over it; it is well marked by kelp. It lies ¾ mile 235° from Falgate Island and 190° from the western extremity of Tamar Island. Round Island kept open south of Capt Tamar will lead south of the rock.

**Bank.**—A shoal with a depth of 11 fathoms, rocky bottom, increasing regularly in all directions up to 60 fathoms, is located about 2½ miles 242° from Astree Rock, forming a circular bank about 1,100 yards in extent.

With strong westerly winds this bank should be avoided on account of the heavy sea which breaks over it.

**Rhoda Pass,** between Tamar Peninsula and Tamar Island, extends 3 miles from Cape Rhoda to Grup Point. It is the usual route for the small trading steamers which ply between Punta Arenas and Port Prat, in Last Hope Inlet.

Half a mile northwestward of Cape Rhoda lie the Direction Islets, two rocks similar in appearance, and 500 yards northeast of these islets are two others which resemble each other, called Estribor and Babor.

Carabantes Rock lies 600 yards north of the western end of the island of the same name, with the western extremity of Grup Point bearing 35°, distant 1,100 yards.

From the northeastern extremity of Tamar Island extends a chain of islets and rocks, terminating in a group of rocks 600 yards west of Grup Point, on the easternmost one of which stands a black cylindrical beacon.

Near Grup Point lies a second group of rocks, and on the one farthest west stands a red conical beacon. These two beacons bear in a northwest and southeast direction from each other, and between them is the channel, 400 yards wide, with 10 fathoms of water through it. A rock awash lies 2 miles 331° from Port Tamar Beacon.

**Directions.**—To traverse Rhoda Pass round Cape Rhoda about 200 yards outside the outermost of the detached rocks off the cape and steer for the Direction Islets. When ¼ mile from the islets alter the course two points to the eastward to pass midway between the two rocks, Estribor and Babor, having 15 fathoms between them.

Entering the pass in mid-channel, it may be followed without difficulty, as all the rocks are awash or marked by kelp. From the southern or first narrows of the pass shape the course for the black beacon; when abreast of Carabantes Rock the course should be changed a little to starboard, so as to pass midway between the two beacons, after passing which the course should be shaped 336° for the entrance to Smyth Channel.

**Port Rachas** is the bay on the eastern coast of Tamar Island in Rhoda Pass. The holding ground here is tenacious and this port is

an excellent place to ride out a gale as it is easy of access and the squalls, although they come with great force, raise no sea. The kelp, which is shown on the chart and which seems to close the entrance to Port Rachas, does not exist.

When leaving this port it is preferable to pass inside of the row of islets northeastward of it, because the depths are here more uniform than they are to the eastward.

Sargazo Bay, on the eastern side of Rhoda Pass, is full of hidden dangers.

**Beaufort Bay** lies between Tamar Island and Cape Phillip, 8 miles to the westward of north. It is a deep bight, and has two arms, the easternmost of which extends to the northeast and contains Glacier and Icy Sounds. The western arm is the commencement of Smyth Channel. The bay is full of hidden dangers, and should not be used even by light-draft vessels.

**Parker Island,** 7 miles westward of Cape Phillip, is 5½ miles long, of irregular shape, and 1,050 feet high at the highest part. The channel between the island and mainland has not been examined.

**Cape Parker,** the southwestern extreme of Parker Island, is a long sloping ridge with three remarkably symmetrical sugar-loaf hills on it, one behind the other, rising in height from the southern one, which is 370 feet high. These are only conspicuous from the eastward.

A rock, 10 feet above water, lies ¼ mile 202° from Cape Parker, and 2½ miles 281° from the cape is a rock awash, which generally breaks.

At about 800 yards eastward of Woolcott Point is a rock above water, from which a patch of kelp extends for ½ mile in an easterly direction.

This bay is not recommended as an anchorage, but, if compelled through absolute necessity to stop here, the best anchorage is in the center of the cove, between the rock above mentioned and the northern point of the bay, in 13 or 14 fathoms. In the adjacent kelp patches are depths of 5½ to 6½ fathoms.

**Coast.**—The coast north of Parker Island, from Cape Phillip to Barr Point, at 14 miles west of it, is from 1,000 to 1,300 feet high, and is broken by several large openings tending to the northward. From Barr Point the land recedes to the north and west, forming a very large bay, the shores of which were estimated from the summit of Westminster Hall, which lies off its mouth, to be 15 miles distant. It contains numerous islands.

**Westminster Hall** is a precipitous mass of granite rock 1,120 feet high, 9 miles west-northwest from Cape Parker. It is clear on the east and south sides, but to the west and north a chain of islands

and rocks commences, which borders the strait as far as Cape Victory at 28 miles northwest of Westminster Hall. Several casts of from 16 to 22 fathoms, sand and stone, were obtained off the east side of Westminster Hall, and perhaps a vessel could anchor here under the lee in an emergency, but a heavy swell would come round the island, which is not large enough to afford shelter. Westminster Hall has a remarkable appearance from east or west.

**Sir John Narborough Islands.**—This chain consists of two large islands and a large number of small ones. Northward of these islands is Esmeralda Channel, and among them several anchorages, but none to be recommended, especially on account of the lack of information concerning them.

The coast of this group, and that which runs northwestward as far as Cape Victory, is very dangerous, both on account of the large number of rocks, over which the sea always breaks, and because of the currents which generally set over the edges of the line of shoals.

**Cupola,** 190 feet high, is the highest of the numerous outlying islets off Sir John Narborough Islands.

**Rocks.**—The region within a radius of 6 miles of the Cupola should be avoided, as numerous rocks, submerged and awash, exist in this locality.

**Cape King** is the southwestern point of King Island, a precipitous island 2,360 feet high, the highest land in this region. Near the cape are several rocks, and at this point Esmeralda Channel, which leads to Port Cuarenta Dias, is only 400 yards wide, but without special dangers.

**Port Cuarenta Dias** is situated in the middle of a group of small, low islands, which lie about 2½ miles northwestward of Cape King; the largest island, protecting the port on the west, is called Atalaya.

The anchorage space is not more than ½ mile across, with depths between 8 and 14 fathoms, mud, and the anchor will hold here in spite of the violent gusts of wind from the land. The prevailing winds are from the southwest and northwest, the latter being the strongest.

There are three channels leading to the sea, called Boca Chica, Boca Grande, and Boca del Medio, the last two being clearest.

This port is frequently visited, being the port of call and refuge of the vessel which periodically carries supplies to the lighthouse on Los Evangelistas.

**Cape Victory,** in latitude 52° 16′ south, longitude 74° 55′ west, may be considered as the north point of entrance at the west end of Magellan Strait. It consists of a small island about 320 feet high, rugged and precipitous, separated from Victory Island by a narrow channel.

**Los Evangelistas,** consisting of four rocky islets and some detached rocks and breakers, lie 11 miles southwest from Cape Victory. They were thus named by the early Spanish navigators, but they were called the Islets of Direction by Narborough, from their forming an excellent mark from the western mouth of the strait. The islets are very rugged and barren and suited only to afford a resting place or breeding haunt for seals and oceanic birds, but a landing place may be found on one of them, and anchorage among them if necessary. The largest and highest (170 feet) may be seen in tolerably clear weather from a vessel's deck at a distance of 15 miles. The southernmost is, from its shape, named Sugarloaf.

By the latest determinations Sugarloaf is considered to be in latitude 52° 25′ south, longitude 75° 4′ 15″ west.

**Light.**—A fixed white light, varied by a bright flash every half minute, is exhibited on the largest or western islet of Los Evangelistas at an altitude of 190 feet above the level of the sea and 36 feet above the ground and is visible 20 miles.

**Tides** are here very variable, and sometimes set toward the rocks that front Cape Victory and the Narborough chain. High water, full and change, is at 1h., and the tide rises about 5 feet.

Capt. Stokes experienced a current of about 2 knots when 4 or 5 miles west of Cape Pillar and somewhat southward of it.

**Rocks.**—Eastward of Los Evangelistas, bearing and distant from it as given below, are the following rocks: Duble Rocks, 6 miles 84°, 800 yards apart, both submerged; Piedra Tortuga, 7 miles 90°, uncovered at all times; and Ballenato Rock, 10½ miles 92°, uncovered at low water.

A careful search over an extensive area surrounding Los Evangelistas failed to locate any other dangers, thus leaving a clear passage about 4 miles wide, with 20 fathoms in the middle, between Los Evangelistas and the rocks above mentioned; but this passage is not recommended.

### CHANNELS AND WATERS NORTH OF THE MAIN STRAIT.

**Jerome Channel** leads from the northeast end of Crooked Reach, between Jerome and Arauz Points, 10 miles north-northwestward, thence 11 miles north-northeastward, where it opens into Otway Water. In the first part of its course it has an average width of ¾ mile and extends between shores which differ notably from each other, the eastern being low and barren near the sea, but wooded inland; whilst the western shore consists of high wooded hills rising directly from the water's edge, and of which the higher summits are covered with snow for more than half the year.

From abreast Condor Canal northward Jerome Channel widens gradually, and in this part of its course are several small islands

with clear shores, which form good marks of reference in navigation.

**Tides.**—The tides are very regular in Jerome Channel, and range 6½ feet. In the southern end of the channel the flood stream runs 6 knots and the ebb 5 knots, but their velocity is much decreased on approaching Otway Water.

Vessels should be on their guard against being set off their course by the strong tidal streams when in this channel.

**Arauz Point,** on the east side of the entrance, is low, with foul ground extending nearly 400 yards from it in a westerly direction; the western entrance point is clear.

On the north side of Arauz Point the shore recedes and forms a bight 2 miles across between the entrance points; the southern part is named Arauz Bay and the northern Three Island Bay; from the west point of the latter bay a kelp patch extends 400 yards in a southeasterly direction; neither of these bays are to be recommended. Wood and Seal Coves on the western shore of the chanel are small and afford indifferent anchorage.

**Real Cove,** on the eastern shore, affords anchorage with good holding ground in from 10 to 12 fathoms, sand and shells, but is exposed to the westward.

In entering, pass the southeast point of the cove at a distance of ¼ mile to avoid the shoal which extends southward from Teran Islands.

**Teran Islands,** two in number, situated nearly mid-channel, 8 miles within the entrance, lie northwest and southeast from each other, are of equal size, wooded, and about 30 feet high; kelp patches extend half a mile in a southeast and in a northwest direction from the islands.

The *Alert* passed westward of these islands, and the passage appeared clear of danger.

The eastern shore of Jerome Channel from abreast Teran Islands trends in a northerly direction to Cape Charles, at the entrance to Otway Water. Between Cutter Cove at 3 miles north of Teran Islands and Cape Charles the mountains are high and rugged.

**Cutter Islands,** two in number, are situated near the south point of Cutter Cove; the westernmost is a small, grassy island about 10 feet high and lies about 2½ miles, 5° from north Teran Island; the easternmost is 100 feet high.

**Cutter Cove** has good holding ground, but is exposed to violent squalls from the westward which come down the valley of Nuñez Arm on the opposite shore.

The buildings of the Minas Copper Company are situated on the shores of Cutter Cove, and constitute a good landmark, visible from the channel. There are two piers.

**Tree Island,** the northernmost of two small islands lying near the shore, at 3½ miles northward of Cutter Cove, has a single tall tree on its summit. Rocks and kelp extend about 200 yards in a westerly direction from Tree Island.

**Condor Inlet, or Canal Condor,** opens to the southwestward of Cutter Cove, and is well marked at its south entrance by Cape Forty-five, which is high and has deep water close-to. The inlet extends to the northwest for 5 miles and has a good harbor at its head, where a small creek, which is dry for part of the year, connects it with Botella Lake.

The valley of this lake, with others to the northwest, affords easy communication with Perez de Arce Inlet, in Xaultegua Gulf.

The navigation of Condor Inlet is easy, as its waters are clear until near the head, where there are some rocks in mid-channel, well marked by kelp, but strong williwaws come down from the high hills which form its shores. In the entrance the tidal streams form heavy overfalls and tide rips.

**Port Condor,** situated at the head of the inlet to the northward of Dagnino Island, affords good anchorage in 12 fathoms, sand and mud, midway between the island and the shore.

To reach the anchorage the passage westward of Dagnino Island should be taken.

**Tides.**—It is high water, full and change, in Port Condor, at 3h. 24m.; springs rise 4½ feet.

**Llanza Creek,** with depths of from 3 to 6 fathoms, forms the northwestern arm of Condor Inlet. Kelp grows across the entrance, which is also narrowed by some rocky islets.

**Port Henry,** on the southern shore of the inlet, at 2 miles within the entrance, is deep and clear.

The best anchorage is in from 18 to 20 fathoms, sand and shells, at 700 yards southward of Piedra Point, situated near the entrance on the western shore of the port.

**Corona Islands,** situated about 3 miles northward of Tree Island, consists of three islands, the easternmost of which, Pan de Azucar, or Sugarloaf Island, lies nearly in mid-channel, is conical in shape, 328 feet high, and wooded; the northernmost, Corona Island, is 279 feet high, and saddle-topped, but lies so close to the shore that it can not be distinguished from the mainland when seen from the southward; it is, however, easily recognized from the northward.

Ward island, 52 feet high, is the smallest and most western of the group.

**Nuñez Arm,** opposite Cutter Cove, is of no use as an anchorage, being full of kelp.

**Sulivan Sound,** at 5 miles northeast of Nuñez Arm and abreast Corona Islands, contains a very small and indifferent anchorage in

a bay in its northern arm, sheltered by Miguel Diaz Island; the remainder of the arm is shoal.

The western arm is clear and navigable throughout its extent, but does not afford any shelter.

Cape One forms the south entrance point to the sound; rocks that dry at low water extend 200 yards from it.

**Directions.**—When entering Jerome Channel keep nearer the western shore in order to avoid the shoals extending from Arauz Point; after passing this point steer in mid-channel until abreast of Seal Cove, when alter course to pass between Terran Islands and the western shore. From abreast of Cape Forty-five steer for Cape One and from thence to pass between Corona and Pan de Azucar Islands and into Otway Water. A mid-channel course should then be taken between Islets Point, on the northern shore, and Luis Point, on the southern shore, from both of which foul ground extends for more than a mile.

**Otway Water** opens from Jerome Channel eastward of Manning Point and Cape Charles. The former slopes gradually to the beach and has two small islets off its extremity. Cape Charles has three summits decreasing progressively in height toward the sea, and at its foot is a small mound covered with moss of a reddish yellow color.

Otway Water is 50 miles long and about 15 wide. The western reach is very deep, thence it diminishes gradually in depth toward the eastern end which is relatively shallow.

The western portion of the gulf is surrounded by high and steep hills, covered with dense forest, with steep shores and small beaches here and there. In the eastern portion the hills decrease gradually in height toward the eastward, the shores are low, fronted by beaches, and afford landing in fine weather.

**Tides.**—It is high water, full and change, at 3h. 10m. in the northern end of Jerome Channel, and at 4h. 5m. in the entrance to Fitzroy Channel. The rise of tide is about 5¾ feet. The tidal streams are imperceptible in the open part of the gulf.

**Supplies** are abundant owing to the ranches on the eastern shores of the gulf and to the proximity of Punta Arenas, with which they are connected by road and telephone.

Fish and shellfish are abundant.

**The western shore** of Otway Water rises gradually to the back range of hills and is a dense forest between Bending Cove and Grimal Point at 32 miles northeast of it. Childs Bluff, the northeast entrance point of Bending Cove, is about 100 feet high, cliffy, and wooded on the top. Islets Point, 2½ miles northeast of Childs Bluff, is low and rocky, with shoal ground extending nearly half a mile from the shore. From Villiers Point at 5½ miles northeast of Islets Point, to Martin

Point 4 miles farther to the northeastward, several detached rocks and islets lie near the shore. Sunshine Point is low and sandy; Boer Rivulet, whose waters are of a reddish color, discharges itself to the northward of this point. Lackwater Point, 14 miles northeast of Sunshine Point, is a low, sandy spit with several boulders on the beach.

**Fanny Bay,** between Solitary and Villiers Points, is divided into two arms. It is surrounded by high hills and its waters are deep. In the western arm are numerous islets and some shoals, but all are marked by kelp and surrounded by deep water. The only anchorage in the bay is at the head of the southern arm and is only suitable for vessels of moderate size. Port Valderrama, between Solitary Point and Gidley Island, affords sheltered anchorage for very small vessels.

**Port Toro,** the larger and southern of the two small bays between Martin and Hamond Points, is narrow, 1 mile in depth, and well sheltered from all winds except those from the eastward, which are very rare. The anchorage, suitable for vessels of any size, is near the head of the port in 8 fathoms, sand and shells, abreast the extreme of a conspicuous cliff on the southern shore.

**Beacon.**—A beacon, consisting of a post surmounted by a cylinder, stands on Toro Point on the south side of the entrance. Mount Toro, a pyramidal mountain 3,260 feet high, situated 5 miles inland from the port, forms a good mark when coming from the eastward.

**Piedras Reef,** ¾ mile in length and 400 yards wide, lies 1 mile to the westward of Piedras Point. Northeast of this reef, and opposite the mouth of the Rio de los Patos, is a large patch of reefs.

**Camden Cove,** to the eastward of the cape of the same name, is open, but affords good holding ground in 6 fathoms, mud, near the shore; boats can land on the eastern part of the sandy beach.

**Silva Palma Sound** opens to the southward of Vivian and Englefield Islands and to the eastward of Cape Flinn. The sound is 4½ miles wide at its entrance and extends to the southward and southwestward for 25 miles.

Titus Narrows, 12 miles within the entrance, are only navigable by boats, although the depth is not less than from 13 to 16 feet. Above the narrows the sound again widens but is shallow, and at the head are numerous islands.

In all its extent this sound has only two anchorages; one near the eastern shore 8 miles within the entrance, in 11 fathoms water, muddy bottom, suitable for vessels of any size, and although open to winds from the southward, these raise but little sea; the other near the western shore, 3 miles farther in, better sheltered, and in 16 feet water. Eastward of the latter anchorage is a shoal extending from the eastern shore to mid-channel.

**Englefield and Vivian Islands,** 348 and 403 feet high, respectively, flat-topped, and wooded, lie about 2½ miles from the shore between Martin and Sunshine Points; a spit extends ⅓ mile in a northwesterly direction from the northwest point of Englefield Island (the northern).

On the eastern side of Vivian Island is Port Ward, suitable as a temporary anchorage for a vessel overtaken by fog or bad weather. It is sheltered from the westward. The anchor can be let go in 16 fathoms, bottom sand and shells.

**Indian Cove** lies westward of Grimal Point. From the latter a rocky shelf extends for 400 yards to the southwestward, ½ mile westward of which is a reef extending to the coast. There is anchorage for vessels of moderate size between these reefs.

Grimal Point has a clump of trees on it, and it is here that the dense forest which covers the shores of the western part of the gulf begins to diminish, and farther east is only seen in patches.

**Eastern shore.**—Torino Bay, 4 miles eastward of the entrance to Fitz Roy Channel, is open but affords anchorage in 8 fathoms, sand and shells, at 1 mile from the coast. The greater part of the bay is foul, being full of rocks and kelp; good landing is to be obtained in westerly winds.

**Wickham Sound** trends to the southward and southwestward for 16 miles, and is clear and navigable throughout its extent. It also affords two anchorages; one south of Fondeadero Island, near which the sound bends to the southwestward, in 8 fathoms water, muddy bottom, with space sufficient for two large vessels; the other at the head of the sound, in 5 fathoms water.

**Port Pomar** is a good anchorage situated 1½ miles southwest of Cape Stokes. When making this port a berth of not less than half a mile should be given to the western entrance point, from which kelp extends for a distance of 800 yards; Roa Island, situated to the north of the eastern entrance point, should be passed at a distance of from 400 to 600 yards, after which a vessel should steer for the center of the port, anchoring a little to the southeastward of it in 13 fathoms, bottom of mud and shells forming good holding ground.

In this position a vessel will be sheltered from all winds, especially those from the southwest, from whence violent squalls come down a gap in the head of the port when it is blowing in the gulf.

Roa Island is nearly 200 feet in height, rounded in form, and of a yellowish color.

**Occasion Creek** is a small bay situated to the eastward of Cape Charles. It affords anchorage, sheltered from southwest winds in 8 fathoms at 400 yards from its head.

**Fitz Roy Channel,** leading from Otway to Skyring Water, is much narrowed by shoals which extend from most of the points,

some even to mid-channel, making the navigation intricate; the difficulty is increased by the tide which runs through the channel with a velocity of 3 to 4 knots per hour.

The eastern shore of Fitz Roy Channel is about 40 feet high and sloping, the western is low with the exception of Fenton Point, on the northern side of the entrance to Beagle Harbor. Both shores are bordered by extensive and fertile prairies, on which graze a large number of cattle.

On the shores of the channel are many farmhouses, nearly all in telephonic communication with Punta Arenas and with Port Prat in Last Hope Inlet.

Provisions can be obtained from the houses to the southward of the bay, but water can only be obtained from open pools near the beach.

**Hall Point,** the southwest entrance point to Fitz Roy Channel, is a low rocky spit. Bolton Bluff, 1 mile northward of Hall Point, is a brown slope without vegetation and opens to view when bearing north-northeast. A bank with 16 to 18 feet water, and 8 fathoms close-to, and on which are some sunken rocks, extends nearly a mile from the shore between Hall Point and Bolton Bluff.

**Beacon.**—A white pyramidal wooden beacon, surmounted by a conical topmark, 33 feet in height, stands on Hall Point.

**Port Curtze,** situated on the west shore of the channel, in the southern part of the bay which opens to the northward of Titus (Sandy) Point, is the best anchorage in the channel, being well sheltered from westerly winds and from the currents.

The anchorage is in 6 fathoms water, muddy bottom, with the beacon on Titus Point bearing 120°.

**Beacons.**—A truncated pyramid of masonry, surmounted by a post with cylindrical topmark, the whole painted white, stands on Titus Point.

A similar beacon is situated at the head of the small bay to the westward of Arnott Point. These beacons in line bearing 331° lead through the entrance to the channel clear of the shoals that extend from the western shore.

**Beagle Bay** is useless as an anchorage, being obstructed by a shoal that extends out from its head almost to the line of its entrance points, the edge of this shoal is very steep-to.

**Santa Cruz Narrows,** between Fenton and Turn Points, are 2 miles in length with an average width of 500 yards. The channel is clear until near the shores, from which kelp extends for a short distance. The current attains a velocity of 3 knots an hour, causing overfalls when it is running at its greatest strength.

**Palomares Bay,** situated on the eastern shore of Santa Cruz Narrows, is well sheltered from all winds by low hills and affords anchorage in from 8 to 10 fathoms water, bottom sand and shells.

It has the disadvantage that the tidal streams run strongly through it.

**Amigos Cove,** on the eastern shore in the northern entrance to the channel, has good holding ground but is open to the wind and sea from the northwestward; it is therefore preferable to anchor ½ mile to the southward of it, in mid-channel, in 7 fathoms water, bottom shingle and shells.

There are two small piers used by the local steamers.

Supplies can readily be obtained from the stores in the settlement; there is a regular postal service with Punta Arenas.

**Tides.**—It is high water, full and change, in the southern entrance to Fitz Roy Channel, at 4h. 5m.; springs rise 8¼ feet. The flood tide sets northwest and the ebb southeast.

**Directions.**—From the southward, steer to pass 2 miles from Hall Point, and when it bears west, steer to the northward and bring the beacons on Titus and Arnott Points into line, bearing 331°. Follow this alignment until ½ mile from Titus Point, when steer to pass at a distance of 400 yards from it and thence in mid-channel until halfway between Arnott and Rivera Points, when stand toward the point east of Kelway Cove until the north point of Donkin Cove, on the eastern shore, bears 90°, from which point a reef with 12 to 14 feet water extends more than halfway across the channel, then change course to the northward.

At ½ mile north of Reynard Point, on the eastern shore, is the narrowest part of the channel, where it is not more than 300 yards wide; the navigable portion of this part of the channel is contracted by a bank extending from the eastern shore and by another bank extending from the low point just north of it, on the western shore. The tide in this part was so strong when the *Alert* passed through, and in such a disturbed state, that the edges of the shoals could not be recognized; the flood sets from the bight on the eastern shore toward the shore south of Haase Point on the western shore.

When rounding Turn Point, which is very low, care is necessary with the flood tide not to to be set into the shallow bight opposite it on the western shore. Passing Turn Point at a distance of 300 yards, head for two yellow rocks near the shore about ¼ mile eastward of Meric Point, and keep this course until the mouth of the Quebrada Uribe bears 290°, when stand toward it until about 400 yards off. From this point onward keep in mid-channel.

In the northern entrance depths of 4 fathoms were obtained in mid-channel north of Bennet Point, the northern point of the west shore of the channel.

Bennet Point is clear on the channel side, but a shoal extends northwestward from it. A shoal extends also from Wapshot Point, the north entrance-point of Fitz Roy Channel. When wind and tide

are contrary a heavy sea with overfalls rises in the entrance, making navigation dangerous.

**Skyring Water** is 50 miles in length east and west, with an average breadth of from 8 to 10 miles.

The eastern part has moderate and regular soundings, open shores without islands, and is bordered by low and undulating country, with but little timber.

The western part, on the contrary, is much broken up, the coast being intersected by bays and deep inlets, and there are many islands. The shores are rocky and precipitous, the water deep, and the soundings irregular. The land around rises to lofty rugged mountains inclosing narrow valleys or tortuous channels which run inland in all directions.

The shoals and reefs in this part are not as a rule far from the coast, but, with rare exception, they are unmarked by kelp.

Many of these inlets form good anchorages for the vessels which navigate this region, in which the grazing industry and timber trade have of late years made great progress.

**Communication.**—There is telephonic communication between the settlement Arlington Point, at the entrance to Fitz Roy Channel, and Punta Arenas.

**Eastern part.—Hoppers Bluff,** on the eastern shore of Skyring Water, at 3½ miles northwest of Bennet Point, is a black, cliffy projection, while all the coast near is grassland, from which spits extend seaward with large bowlders.

**Coles Bay** is on the east side of Isabella Point, 8½ miles west of Hoppers Bluff; the water is shallow and the protection poor. Small vessels anchor here to load lumber and wool. A sawmill and several houses stand on the shore.

**Las Minas Bay,** at 12 miles west of Hoppers Bluff, was formerly the shipping place for coal from the Marta Mine, which is now no longer worked, on account of the poor quality of the coal.

The best anchorage is in a depth of 7½ fathoms to the southward of the largest warehouse in the village; it is exposed to the prevailing winds.

**Tides.**—The time of high water in Las Minas Bay is somewhat irregular, and the rise is about 5 feet.

**Port Altamirano,** at 6 miles west of Las Minas, is a small but secure harbor surrounded by land thickly wooded and uniform in elevation, having good holding ground in 9 fathoms, mud. Rocky spits extend nearly ¼ mile from both entrance points.

**Port Williams,** at 4 miles west of Altamirano, affords well-sheltered anchorage, with good holding ground, at a depth of 7 fathoms, at about 800 yards from the northern shore.

**Ponsonby Bay** lies on the south side of Skyring Water, between Point Bennet and Rocallosa Point, at 18 miles farther west.

The whole of the coast is low, with marshes and lagoons in many places; the beach is covered with bowlders, many being of large size. At 2¾ miles west of Bennet Point is a white bowlder, which can be seen from Isabella Point, on the northern shore.

During westerly winds the sea breaks on this coast, making it impossible to land.

Rocallosa Point is bare and light-colored, contrasting with the wood that surrounds it. Three miles to the southeastward of the point is the Magdalena colliery, the working of which is now abandoned.

**Western part—Anchorages.**—The configuration of the western part of Skyring Water will best be understood by a reference to the chart, on which also the various anchorages are indicated.

**Excelsior Sound,** at the head of the northwestern arm of Skyring Water, is only separated from Obstruction Sound by a narrow isthmus, less than ¼ mile wide, over which is a portage for canoes.

**Gajardo Channel,** the entrance to which is situated in the southwestern shore of Sykring Water, connects it with the Gulf of Xaultegua and thence with Magellan Strait.

The channel is about 25 miles in length, with a breadth of about ⅛ mile for the greater part of the distance.

It is generally deep and clear, but about 15 miles from the northern entrance it bends at right angles to the southeastward and contracts to about 200 yards in breadth. This narrow is obstructed by large rocks, which render navigation difficult, even for boats; the depth of water is not more than from 8 to 10 feet, the tidal streams attain a velocity of about 8 knots, and much ice accumulates here.

**Gulf of Xaultegua.**—The entrance to this gulf lies northward of the Santa Anna Islands, and has a breadth of about 1¼ miles.

The gulf is 15 miles in length, with an average breadth of 4 miles; it is clear and deep, the soundings varying from 275 fathoms in the entrance to 165 fathoms toward the eastern end. The bottom is everywhere mud, but in the eastern part there is also rock in places.

The water near the coast is generally deep, and the few points off which there are dangers do not necessitate a berth of more than ½ mile. Most of the dangers are marked by kelp, and as there is but little current it is always visible.

The mountains which surround this spacious gulf are high and scarped, and approach nearly to the water's edge; they give good shelter to the bays and inlets from the prevailing westerly winds, but williwaws descend the valleys, rendering many otherwise good anchorages unsafe.

The shores are nearly everywhere covered by dense forest, and in the parts sheltered from the wind good timber is found, the oak and ash being abundant; elsewhere the trees are almost all bent, twisted, and dried up, rendering them useless for any purpose excepting fuel.

**Supplies.**—Water can be obtained in many places; fish and shellfish in abundance in the various bays. Land animals are scarce.

**Tides.**—The tides are moderate and regular and do not produce any perceptible current. It is high water, full and change, in Port Bobillier, situated on the southern shore of the gulf, at 0h. 59m.; springs rise 3½ feet.

**Perez de Arce Inlet,** situated in the southeastern part of the gulf, penetrates the coast to a distance of 8 miles, and is about 1 mile in breadth. At 5 miles from the entrance it divides into two branches; at the head of the southern one is a portage for canoes, connecting with Botella Lake.

### DIRECTIONS—STEAM VESSELS—EASTWARD.

**Valparaiso to Los Evangelistas.**—In proceeding down the west coast of Chile, intending to make the passage of Magellan Strait from the westward, it is recommended that the navigator keep in touch with the outlying aids to navigation and check his position by them from time to time, for it is usually impossible to get satisfactory astronomical observations during the two or three days before arrival at the western entrance to the Strait.

Clear of Valparaiso, steer a course so as to pass about 2½ miles off Curaumilla Point and about 12 miles westward of Santa Maria Island; with Santa Maria Island abeam, change the course to 193° and continue this course until Mocha Island is abeam, distant about 11 miles. There is an excellent flashing white light on the western side of Mocha Island, and on the eastern side there is also a flashing white light. It is doubtful if this eastern light could be seen on the course given, but these lights should not be confused.

With Mocha Island abeam, lay a course to pass about 12 miles to the westward of Huamblin Island and about 8 or 10 miles off Cape Raper. It is well to arrange to pass Huamblin Island during daylight and arrive off Cape Raper before dark.

With Cape Raper abeam, distant 8 or 9 miles, lay a course so as to pass about 20 miles to the westward of Esmeralda Island in order to clear the numerous outlying dangers; from this position a course may be laid to pass not less than 6 miles to the westward of Los Evangelistas. On this course care should be taken to pass at least 9 miles to the westward of Duke of York Island, as shown on the chart, and not less than 7 miles to the westward of Cape George, Cambridge

Island, in order to insure safely passing Galicia Rocks and the dangers shown on the chart about 5 miles northward of these rocks.

It is of great advantage to get a fix by Cape George, Cambridge Island, before dark, for it enables the mariner to lay a course close to Los Evangelistas, even though thick weather should set in; if the position of the ship is not accurately known, be sure of sufficient offing when abreast this cape. The season of the year has much to do with the run southward from Cape George, as the length of the day varies greatly in these latitudes, and the long nights require steamers to slow down for daylight before entering the Strait. Cape George is high with an abrupt end, and the top is level.

**Currents.**—Reports concerning the currents off the west coast of Chile northward of Cape Raper are rather conflicting, but recent information seems to indicate that a larger part of the shoreward set experienced is more likely due to the prevailing westerly winds and sea than current. Between Huafo and Huamblin Islands, however, a pronounced inshore set has been reported on good authority. The large mail steamers allow for an eastward set of 1 knot during a night or day of thick weather, but smaller and low-powered steamers must be governed by the prevailing conditions.

From the vicinity of Western Rock southward, and when the wind is northward of northwest, there is a very pronounced set, as nearly as possible in a 180° direction until within the entrance to Magellan Strait, which attains a rate of as much as 26 miles in 24 hours. This is very important, as the northerly wind invariably brings steady rain and sometimes lasts for 72 hours without cessation, so that celestial observations are out of the question, as also are soundings.

**When approaching Magellan Strait** it is of the utmost importance that Los Evangelistas be sighted. These islands are a good landfall both by day and by night, as they are 170 feet high, and the light is visible 20 miles.

When Los Evangelistas have been made, round them so as to bring the light to bear 33°, distant 3 miles, and then lay a course to pass Cape Pillar abeam, distant 4 miles.

When laying a course to counteract the southward set existing inside Los Evangelistas, especially when steaming at slow speed, great care should be exercised not to approach within a radius of 6 miles of the Cupola, as dangers have been discovered in this vicinity. This set is sometimes of sufficient strength to cause a vessel to make Cape Pillar on the port bow, and therefore care must be taken to make good the course.

The general appearance of the northern side of the entrance and for some 30 miles within is that of numerous high islands and de-

tached rocks, with occasional long ledges of low rocky formation making out from them. The appearance of the southern side as seen in the distance is a very high and almost flat tableland, the rugged peaks of which are hidden by the heavy clouds which hang over them. As you approach the land, Cape Pillar and, farther to the right, Cape Deseado become visible, and numerous peaks are seen. The high tableland southwestward of Cape Pillar slopes abruptly nearly to the sea, then shoots to the southward and westward, forming a long and rather low land spit, at the extremity of which are two or three very prominent detached rocks. At the northern extremity of Cape Pillar is a large detached rock, 310 feet high, whose outline against the cape can be indistinctly seen from the northward and westward, but is clearly seen as a detached mass as you pass to the eastward, and makes a conspicuous and characteristic mark. From Cape Pillar, for a distance of about 10 miles, the land appears to slope to the eastward, with many rugged peaks, all sloping to the sea.

**Sea Reach.**—After bringing Cape Pillar abeam, it is recommended to favor slightly the southern shore, having due regard for the rock and shoal off Port Mercy. Continue to favor the southern shore through Sea Reach, as by doing this the danger of mistaking the course of the strait in thick weather and passing Santa Anna Islands on the wrong side into the Gulf of Xaultegua will be avoided.

Westminster Hall and Tamar Island, to the north, and Hamilton Head, Cape Cortado, Cape Cuevas, and Felix Point, to the south, assist the mariner to determine his position in Sea Reach.

After passing the light eastward of Felix Point, Cape Upright, a bold headland, one of the best landmarks in the strait, will be seen on the starboard bow. The light on Sentinel Island will be seen open of Cape Upright. It is well to pass this cape abeam at a distance of 2 miles and then keep the southern shore not less than 1½ miles on the beam until near Havannah Point, when the northern shore should be favored until abreast of Shelter Island.

**Long and Crooked Reaches.**—The lighthouse at Cape Cooper Key will be of great value in entering Long Reach.

Long Reach is free of dangers. The beacons on Entry Island (off Port Angosto) and Mount Possession, as well as the peculiar formation of Cape Notch should aid the navigator, and a mid-channel course may be steered with safety as far as Cape Quod. Care should be taken not to mistake False Cape Quod for Cape Quod itself. These capes are very similar, but Cape Quod may be identified by means of Beware Island (25 feet high), just westward of it.

After passing Cape Quod a vessel entering Crooked Reach should be careful to avoid Crooked and Anson Rocks. Each is buoyed, and

by keeping over toward El Morrion and Cape Crosstide these dangers will be safely passed. The light on El Morrion will facilitate navigation in Crooked Reach, being seen directly ahead in standing down Long Reach.

Beware Island kept slightly open of Cape Quod will lead southward of Crooked Rock, and Anson Rock is cleared by keeping the notch on Cape Quod open southward of Big Borja Island. El Morrion (1,101 feet high), on the southern shore, is a conspicuous and useful landmark in Crooked Reach. Attention to the state of the tide is necessary, as off Cape Crosstide the Atlantic and Pacific streams meet, causing strong currents, the direction of which varies with the time of tide. No difficulty will be experienced, however, if a close watch is kept on the set of the vessel and a mid-channel course followed until abreast Rupert Island.

Lights are established at El Morrion, and at Cohorn Island, southeast of the entrance to Jerome Channel, but these lights are unwatched and too much reliance should not be placed in them; otherwise the passage of Crooked Reach at night would be feasible.

**English and Froward Reaches.**—Until the lights mentioned in the previous paragraph have established their reliability it is not recommended to attempt navigation of Long Reach and Crooked Reach except in the daylight, but after Rupert Island is passed and English Reach is entered there is no reason why a steamer should not proceed eastward to Punta Arenas at night if it is desired so to do, as there are few dangers, and the usual precautions are all that is necessary to insure safe navigation.

It is customary, however, to favor the northern shore from Rupert Island, then, passing Cape Holland at a distance of about 1 mile, enter Froward Reach and pass Cape Froward at about 1 mile and Cape San Isidro Lighthouse at about 2 miles. This latter cape may be identified by Mount Tarn (2,685 feet high) if the weather will permit a view of it.

**Famine and Broad Reaches.**—The course from off Cape San Isidro Lighthouse passes into Famine Reach; Santa Anna Point should be passed at a distance of not less than 1½ miles, which will carry clear of Georgia Reef; San Isidro Light is obscured westward of 198° and thus serves as a guide to clear Georgia Reef. The course through Broad Reach is clear to Punta Arenas.

The mariner's attention is called to the usefulness of sextant angles as applied in the three-point problem when navigating between this point and the Atlantic. The lighthouses, beacons, and landmarks are sufficient in number and so placed as to render this method of fixing position entirely feasible.

**New Channel.**—From Punta Arenas, New Channel is considered the best route to the Narrows and is now generally used. Upon leaving Punta Arenas it will be noted that the eastern extremity of the shoal off Sandy Point is marked by a lightbuoy, and that as Santa Magdalena Island is approached the southeastern edge of the shoal making out from the island is marked by another lightbuoy. There is a beacon on the western part of Quartermaster Island.

When entering New Channel, unless the ship's position is accurately determined, it is wise to swing over a little toward Quartermaster Island in order to avoid the shoal making out southeastward from Santa Magdalena Island. From a position midway between this island and Quartermaster Island a course of 357° is recommended. Care should be exercised to check the position of the ship by means of bearings on Santa Magdalena Island, and to see that the ship is not set over toward New Bank. Before Santa Magdalena Light is brought on the port quarter, Cape St. Vincent in line with the Cone Lighthouse should be seen a little on the starboard bow and the course should be changed, if necessary, in order that the vessel may keep slightly to the westward of this range, until after passing the 3-fathom spot shown on the midwestern portion of New Bank, which is marked by a lightbuoy. From this point there should be no difficulty in making the entrance to the Second Narrows, but the east-going or ebb tide sets strongly to the northwestward across the course when off New Bank, and at this state of the tide it is well to keep closely to the above instructions until all danger of being set on Marta Bank is passed. The west-going or flood tide sets southward over the shoal making out to the eastward from Santa Magdalena Island with considerable strength, but the danger of running on this shoal is not so great for an easterly as for a westerly passage of the strait. The light station on Santa Magdalena Island exhibits a flashing white light, visible 17 miles.

**Queen Channel.**—If it is desired to make the passage by way of Queen Channel, the following directions are recommended: From a position with Cape Porpesse bearing 318°, distant 1¾ miles, steer 36°, using the precaution of keeping Sylvester Point open of Alfred Point (Elizabeth Island) until the southern end of Santa Magdalena Island bears 105°; then head for Santa Marta Island and hold this course until the southern end of Santa Magdalena Island bears 137°, when a 30° course will pass Sylvester Point, distant ½ mile. This 30° course maintained for 3 miles beyond Sylvester Point should bring Cape St. Vincent on the bow at a point clear of Marta Bank, and the vessel head may be changed so as to take a mid-channel course through the Second Narrows.

**Other channels.**—A vessel drawing 18 feet or over should not attempt to pass through Pelican Passage and Royal Road to the westward of Elizabeth Island.

The dangers on the edges of the bank off Santa Marta and Santa Magdalena Islands render it inadvisable for a vessel of any size to pass between these islands or between them and Walker Shoal.

**The Narrows.**—All vessels should calculate the time of the ebb stream and, if possible, leave Punta Arenas in time to carry a fair tide to the eastern entrance of the strait. It must be remembered in this calculation that the ebb stream does not begin to flow into the channel until three hours after high water. This is imperative with a low-powered steamer, for it is not advisable for a vessel of less than 15 knots to attempt to buck the full strength of the tide of the Narrows, especially in the First Narrows, where at the time of springs the current reaches 8 knots. It would be more prudent for such a vessel to anchor in Philip Bay and await the change of tide. The rise and fall of tide in Philip Bay is 17 feet at the time of springs.

Upon entering and leaving either narrows the confined water spreads out and sets strongly on shoals at either side of the channel. The mariner is cautioned to guard against the changes in direction of the currents at the entrance to the narrows, and also those in New Channel, where they set directly across the course toward dangerous shoals. As a matter of precaution it is suggested to apply the deviations to all the bearings of prominent objects likely to be used before entering the narrows, as particularly when running eastward with the tide there will be but little time to apply corrections to the compass. Here simultaneous sextant angles would be particularly serviceable in plotting the ship's position.

**Second Narrows.**—The passage of the Second Narrows is plain sailing, but upon leaving the eastern entrance the Cone Lighthouse must be kept well open of Gregory Point and not allowed to bear less than 268° to insure safety in passing Tribune Bank. The navigation of the Second Narrows has been greatly facilitated by the recent establishment of this lighthouse on the Cone and lessens the danger attending the navigation of these Narrows in the nighttime. During the daytime prominent landmarks will be easily recognized in reasonably clear weather, if the ship's position has been carefully fixed from time to time. The currents, however, are swift, but by keeping a midchannel course little difficulty will be experienced.

From a position about 2 miles due south of Cape Gregory a course of 78° is recommended. Bearings taken on Gregory Shoulder from time to time will show the progress made, and if the lead is used and careful attention paid to the courses no danger need be appre-

hended after leaving the Second Narrows, for if soundings obtained are less than 12 fathoms, it is evident that the vessel is too far to the northward, and the course should be changed to the southward. Unless a vessel is a long way out of her course, 12 fathoms will not be found to the southward, and, owing to the set of the tidal streams, she will be unlikely to be so far out of her course.

When Triton Bank Lightbuoy bears 350°, distant 1¾ miles, steer a 70° course, on which course Baxa Point Beacon, visible 15 miles, should be seen directly ahead. When Barranca Point Beacon bears 3°, lay a midchannel course through the First Narrows. Soundings might be of assistance in determining the proper point at which to change course here. A light tower on Barranca Point stands 1½ miles 80° from the beacon. Navigators should be careful to give Triton Bank Lightbuoy a berth of at least 1¾ miles on account of the reported 4-fathom spot 1 mile southward of this bank.

**First Narrows.**—The land at the western end of the First Narrows is low and will not be clearly made out until some time after Dixon Hill and other hills on the south side, farther inland, are seen. These hills in the distance look like islands, but as the entrance is approached their character is disclosed, and the summit of Barranca Point, on the northern side, and Baxa Point, on the southern side of the entrance, become visible. Mendez Point, on the south side, and Nunez Head, on the northern side, well within the Narrows, should also now be seen. A light tower on Mendez Point will help to identify it. Barranca Point Beacon is not as prominent as Baxa Point Beacon, but under ordinary circumstances will be made out in sufficient time to get a bearing. Gulf of St. Vincent Rock and Satellite Patch are dangerous shoals on either side of the entrance, and the ship's position should be accurately determined when approaching them. The red sector of Delgada Point Light covers Satellite Patch.

Delgada Point Lighthouse will be sighted before entering the First Narrows and will appear as if slightly detached from the low point; it might, with the adjoining houses, be mistaken for a distant steamer.

After passing midway between Satellite Patch and Gulf of St. Vincent Rock a mid-channel course should be steered. The light on Deglada Point is a valuable aid in making or leaving the Narrows in the nighttime, and its usefulness is further enhanced by two red sectors, one of which, as previously stated, protects the mariners from Satellite Patch and the other covers Plumpers Bank. Vessels are requested to display their numbers when passing this light station.

Between Nunez Head and Delgada Point the beacons on Cape Orange and Direction Hill should be picked up. A lighthouse also stands on Direction Hill. From Delgada Point eastward the ebb

current runs nearly true with the channel, and the danger of being set off the courses is thereby lessened.

With Delgada Point abeam, steer 50° until directly between Cape Orange Beacon and Direction Hill Lighthouse, when the course should be changed to 56°; this should be held until Direction Hill bears 273°, when the course should be altered to 93°, bringing Direction Hill 273° dead astern. This course made good, Orange Bank Lightbuoy will be passed not less than 1¼ miles on the starboard hand.

**First Narrows to Eastern Entrance.**—Direction Hill must not be allowed to bear northward of 273° in order to give the shoals off Orange Bank a comfortable berth. When Cape Possession Light is abeam, a course of 102°, made good, will lead about 3 miles southward of Dungeness Lighthouse.

In passing Wallis Shoal at night Cape Possession Light must not be lost sight of, as its obscured sector passes close southward of the shoal. When running the 102° course, suggested above, in the daytime, Cape Virgins Lighthouse will be seen before Dungeness, as the latter is on a low spit.

If obliged for any reason to anchor anywhere eastward of the First Narrows, it should not be forgotten that there is a range of tide varying from 36 to 42 feet.

Continuing the course of 102° from Cape Possession for 13 miles beyond Dungeness, making allowances for the influences of the tides, will bring the vessel up to the narrow part of Sarmiento Bank. This part of the bank may be crossed in safety with a smooth sea after half flood and before half ebb; otherwise, with conditions less favorable or in a deep-draft vessel, it might be advisable to round this bank.

The mariner is protected by a sector from the subsidiary fixed white light at Dungeness Light Station thrown over Nassau Rock. Should this subsidiary light become visible, the vessel must immediately be hauled to the southward.

As a matter of caution, when leaving the Strait, due consideration must be given to the state of the tide and the attendant currents. The set over Sarmiento Bank is liable to prove deceiving; in any case, it is well to make liberal allowances in laying a course across this bank, and frequently fix the position by the lights on Dungeness and Cape Virgins if they are visible.

Many masters familiar with this locality pass close to Nassau Rock in crossing Sarmiento Bank, but owing to disasters reported off Cape Virgins a wider berth is recommended as a safer course. Clear of this bank a vessel will have completed the passage through the Strait.

*Table of headlands and conspicuous islands.*

| Name. | Character and value. | Distance from Cape Pillar. |
|---|---|---|
| | | *Miles.* |
| Los Evangelistas, N.[1,2] | Bold, rocky (170 feet); greatest importance | [2] 24 |
| Cape Pillar, S | Bold, rocky, very important | |
| Westminster Hall, N | Bold, rocky; conspicuous | (3) |
| Hamilton Head, S | Precipitous; valuable | 10 |
| Cape Cortado, S | Perpendicular rock; unmistakable | 11½ |
| Cape Cuevas, S | Shows like a promontory; open of Cape Cortado and bearing 140° clears dangers off Port Mercy. | 16½ |
| Felix Point, S.[4] | Easily distinguished; a peak above the point, 630 feet | 26 |
| Tamar Island, N | West tangent forms good mark | 33 |
| Cape Providence, N | Bold | 43 |
| Cape Upright, S.[5] | Flat topped, square faced; very prominent | 46 |
| Cape Monday, S | Abrupt; flat summit (925 feet), conspicuous | 56 |
| Cape Cooper Key, N.[5] | Rounded and bold; conspicuous when seen ahead | 64 |
| Shelter Island, N | Covered with vegetation (385 feet); conspicuous | 71 |
| Cape Notch, N | Remarkable perpendicular rock (590 feet); very valuable | 83 |
| False Cape Quod, N | Bold, rocky (851 feet); easily mistaken for Cape Quod | 93 |
| Cape Quod, N | Bold; conspicuous; identified by Beware Island | 94 |
| El Morrion, S.[5] | Perpendicular rock, bright clay color; excellent mark | 97 |
| Cape Crosstide, E | Rough and massive; very useful | 100 |
| Rupert Island, S.[5] | Trees in the center (358 feet); conspicuous | 110 |
| Cape Holland, N | Bold and high | 131 |
| Cape Froward, N | Unmistakable in form; useful | 148 |
| Cape San Isidro, W.[5] | Low, rounded hill; trees; interior Mount Tarn inshore | 164 |
| St. Anna Point, W | Large clump of trees on end; interior Mount San Felipe inshore. | 174 |

| Name. | Character and value. | Distance from Punta Arenas. |
|---|---|---|
| | | *Miles.* |
| St. Magdalena Island, W.[5] | Hilly; easily distinguished; important | 20 |
| Sylvester Point, W | Useful; easily distinguished | 25 |
| Cape St. Vincent, S | do | 30 |
| Gracia Point, N | do | 30 |
| Cape Gregory, N | Rises to a sandy hill 209 feet high | 43 |
| St. Isidro Point, S | Low sandy | 44 |
| Barranca Point, N.[5] | Low cliffs, only ones in vicinity; useful; beacon | 65 |
| Baxa Point, S | The fourth cliff from southward; useful; beacon | 65 |
| Delgado Point, N.[5] | Distinguished by small settlement; light | 73 |
| Direction Hill, N.[5] | Easily distinguished; light and beacon; useful | 78 |
| Cape Orange, S | Sharp conical hill (152 feet); unmistakable; beacon | 77 |
| Cape Possession, N.[5] | Bold, perpendicular (385 feet); useful; light | 94 |
| Catherine Point, S | Very low when tide is high | 105 |
| Dungeness, N.[5] | Very low spit; light and beacon; very important | 114 |
| Cape Virgins, N.[5] | Prominent (135 feet); useful | 126 |

[1] The initial following each name indicates its position relating to the main channel.
[2] Outside.
[3] Opposite to, northeast.
[4] Lighthouse is on an island 2 miles east of Felix Point.
[5] Lights.

*Table of tidal data.*

| Ports or anchorages. | H. W. F. and C. | Rise. |
|---|---|---|
| | *H. m.* | *Feet.* |
| Port Mercy | 1 22 | 4 |
| Tuesday Bay | 1 00 | 6 |
| Port Churruca | 1 00 | 6 |
| Port Tamar | 1 40 | 6 |
| Port Angosto | 40 | 4 |
| Playa Parda Cove | 1 08 | ..... |
| Field Anchorage | 1 00 | 4 |
| Arathoon Bay (Marsh Basin) | 1 10 | 4 |
| Havergal Bays | 1 00 | 4 |
| Notch Cove | 1 00 | 5 |
| Swallow Cove | 1 17 | 5 |
| Borja Bay | 1 30 | 6 |
| Tilly Bay | 1 30 | 6 |
| York Road | 11 00 | 9 |
| Fortescue Bay | 34 | 8 |
| Cordes Bay | 34 | 8 |
| Snug Bay | 40 | 8 |
| St. Nicolas Bay | 50 | 6 |
| Port Famine | 12 00 | 6 |
| Punta Arenas Road | 12 00 | 4 |
| Royal Road | 11 47 | 1 8 |
| Gregory Bay | 9 30 | 1 21 |
| Philip Bay | 9 29 | 1 17 |
| Stonewall Anchorage | 8 35 | 1 36 |
| Sutlej Anchorage | 8 00 | 1 30 |

[1] Spring.

WARNING.—In the eastern portion of the Strait the change in direction of flow does not take place at either high or low water.

*Table of anchorages.*

| Port. | Size of vessels. | Anchorage. | Accessibility. | Distance from Cape Pillar. |
|---|---|---|---|---|
| | | | | *Miles.* |
| Port Mercy | Medium | Dangerous | Difficult | 4.5 |
| Tuesday Bay | Medium; small | Good | Entrance narrow, but channel clear. | 12.0 |
| Port Churruca | Large (450 feet) | Somewhat confined; rocky; best west of Field Anchorage. | Easy through narrow entrance. | 32.5 |
| Port Tamar | Medium | Fair | Requires caution in entering. | 36.0 |
| Port Angosto | do | Fair; rocky | Easy | 58.0 |
| Playa Parda Cove | Small (180 feet) | Well sheltered; mud | Requires caution | 72.0 |
| Field Anchorage | Large | Good | Easy | 78.0 |
| Arathoon Bay (Marsh Basin). | Medium | Fair; mud | Requires caution | 82.0 |
| Havergal Bays: West Bay | do | Poor holding ground; williwaws. | No difficulties | 85.0 |
| East Bay | Small | Good | do | 85.0 |
| Notch Cove | Small (230 feet) | Very good | Intricate | 85.0 |
| Swallow Bay | Medium | Very rocky | Requires caution | 87.0 |
| Borja Bay | Medium (300 feet) | Confined; holding ground excellent. | No difficulties | 98.0 |
| Tilly Bay | Small | Fair; mud | Strong currents | 102.0 |
| York Road | Medium | Not recommended | Easy | 104.0 |
| Fortescue Bay | Large | Very good | Easy; avoid set of current. | 118.0 |
| Port Gallant | Small | do | Requires caution | 119.0 |
| Cordes Bay | Large | Exposed | Open | 121.0 |
| Woods Bay | Large and small | Sheltered from prevailing winds. | do | 133.0 |
| Snug Bay | Large | Good; somewhat exposed. | do | 140.0 |
| St. Nicolas Bay | do | Good | do | 155.0 |
| Port Famine | do | do | do | 170.0 |
| Carreras Bay | Small | Fair | No difficulties | 173.0 |
| Freshwater Bay | Large | Good | Requires caution | 187.0 |

*Table of anchorages*—Continued.

| Port. | Size of vessels. | Anchorage. | Accessibility. | Distance from Punta Arenas. |
|---|---|---|---|---|
| | | | | *Miles.* |
| Punta Arenas | Large | Good | Requires caution | |
| Laredo Bay | do | do | do | 15 |
| Royal Road | Small | do | No difficulties | 32 |
| Jente Grande Bay | do | do | Requires care | 23 |
| Gregory Bay | Large | do | Easy | 46 |
| Off St. Isidro Point | do | do | do | 47 |
| Philip Bay | do | Good holding ground, but exposed. | Open | 52 |
| St. Jago Bay | Medium | Good | Currents; requires care. | 65 |
| South of Baxa Point | Large | do | Open; avoid wrecks | 64 |
| Schooner Anchorage | Small | Indifferent | Open; avoid wreck, not marked. | 75 |
| Delgada Point | do | Good | Easy; shoals rapidly | 74 |
| Plumper Anchorage | Large | Not recommended | do | 82 |
| Off Tandy Point | Medium | Good | Requires care | 93 |
| Stonewall Anchorage | Large | do | Avoid set on Narrow Bank. | 91 |
| Spiteful Anchorage | do | Good in west and southwest gales. | Open | 101 |
| Lomas Bay | do | Not recommended | Difficult | 107 |
| Sutlej Anchorage | do | Good | Open | 114 |
| Zealous Anchorage | do | Good in easterly gales. | Easy | 115 |
| Condor Cliff Anchorage | do | Good, with westerly winds. | Requires care approaching. | 136 |

# CHAPTER VIII.

## PATAGONIAN CHANNELS AND THE OUTER COAST, FROM MAGELLAN STRAIT TO ANNA PINK BAY.

### PATAGONIAN CHANNELS.

**General remarks.**—The southwestern coast of Chile, between Magellan Strait and the Gulf of Peñas, is fronted by a succession of islands of considerable extent, between which are good navigable channels, affording a smooth water route of 300 miles, denominated the Patagonian Channels.

This route is mostly used by vessels desiring to avoid the heavy seas and bad weather so often experienced on passing into the Pacific from the western end of Magellan Strait.

The large full-powered mail steamers generally at once gain the open sea at Cape Pillar, as experience has shown that time is thus saved to them; but vessels of less engine power, to which punctuality and dispatch is not so much an object as avoiding possible danger, will find the Patagonian Channels the best route.

The general features of these channels are high, abrupt shores, with innumerable peaks and headlands remarkably alike in character, their bold, rugged heads giving an appearance of gloomy grandeur rarely seen elsewhere. The shores are generally steep-to and the channels, for the most part, open and free, while the few dangers that exist are usually marked by kelp. The tides are regular and not strong, except in the English Narrows.

In no case are these channels more than 5 miles wide, and average about 1½ miles. In Mayne Channel the navigable width is reduced to 500 yards; Guia Narrows are ½ mile wide, but in the navigation of these there is no difficulty or danger for the largest vessels.

It is at the English Narrows in Messier Channel that the passage is most contracted. Here it is only 200 yards wide, but it presents no great difficulty or danger (excepting to very long vessels) unless a vessel goes through with the wind and tide, which should never be attempted if the wind be strong.

In these narrows the tide runs 6 knots at springs; and as the channel is winding it is, during springs, always advisable to await slack

water, for which purpose the anchorages in Eden Harbor on the south and Halt Bay or Gray Harbor on the north side of the narrows are conveniently situated.

Through the whole extent of the channels the chart and eye must be the principal guides, as it is impossible to give a description of channels so narrow and tortuous with sufficient exactness to guide a mariner without them.

The following description is intended only for steamers, which alone should attempt to make this passage. With care, those of the largest class may go through with perfect safety.

The usual route followed, and that recommended to vessels bound northward, is by Smyth Channel, Sarmiento, Inocentes, Concepcion, Wide, and Messier Channels to the Gulf of Peñas.

Trinidad Channel, which leads to seaward from the northern end of Concepcion Channel, is exceedingly useful to pass out to the Pacific from the Patagonian Channels in case it is desirable to avoid the possible delay occasioned by English Narrows in Messier Channel. Alert Harbor, at its western end, will afford shelter to a number of large vessels.

From Trinidad Channel vessels can gain the Gulf of Peñas by Picton, Stosch, and Fallos Channels, but that route, although having some advantage in avoiding English Narrows, is not considered so safe as the well-known route by Wide and Messier Channels.

Anchorages may always be had if judgment be exercised and the vessel not pushed on till too late in the day to pick one up; and, even should no anchorage be obtained, the shores, excepting in one or two places, are so bold and steep-to that a vessel may safely remain under way all night under ordinary circumstances of weather.

The surveying vessel *Nassau* on one occasion was caught in this way by the nonexistence of an anchorage, and continued on her course under easy speed all night without any danger as far as the land was concerned, though the floating ice out of Eyre Sound gave the ship some severe blows. In the event of being so caught, and not liking to continue on the course, it is advisable to send a party on shore to keep a fire burning all night, and the sea is seldom so heavy as to prevent boats landing on one shore or the other in safety.

A moderate-sized vessel will find an anchorage every few miles throughout the entire length of the inner or recommended route, the longest run between any two being 27 miles.

After leaving Port Churruca or Port Tamar large vessels may anchor in Mayne Channel, Isthmus Bay, Puerto Bueno, Wide Bay, Molyneux Sound, Henderson Inlet, Señaret Harbor, Port Grappler, Eden Harbor (for English Narrows), Gray Harbor (for English Narrows, bound south), Connor Cove, and at the anchorage outside

Island Harbor. The longest run, between Isthmus Bay and Puerto Bueno, is 77 miles; that between Señaret Harbor or Henderson Inlet to Port Grappel is 51 miles; no other distance between any successive anchorage exceeds 36 miles.

**Caution.**—As there has been no complete survey of the channels between Magellan Strait and the Gulf of Peñas, the navigator is cautioned that, although the charts and directions may be considered sufficient guides by daylight, he must not trust too implicity in them during thick weather, as in some few instances the bearings from headland to headland are not strictly accurate, and the buoys and beacons are not to be depended on.

**Wind and weather.**—Except where an opening occurs the true wind is rarely felt, but it is forced by the high mountains into a kind of funnel, up or down which it always blows. The prevailing wind is from the northward, and sometimes blows with great fury, but, of course, in so confined a space there is never any sea sufficiently high to be dangerous to a vessel or even to a boat. The principal feature in the weather here is not the strength of the wind, but the almost perpetual rain.

Day after day there is this steady downfall, unless the vessel is so fortunate as to arrive in one of those rare breaks of lovely weather which sometimes happen. Then it will seem as if this is one of the most interesting of navigable waters, with smooth sea, well-sheltered anchorages, and surrounded by the most glorious scenery.

As far as the rain is concerned, one season is as bad as another, but the warmth and length of daylight in the summer render that season far better for such navigation.

In these narrow channels during the squalls which frequently occur sharp hailstorms and snow flurries will be felt, even in summer.

The *Solace* experienced three gales in January, 1909, two of which occurred in the English Narrows. The barometer fell from 29.91 inches to 29.39, from 29.83 to 29.40, and from 29.58 to 29.28 in the three gales, respectively. The normal barometer at that season was apparently well under 29.80.

**Ice.**—In July, 1913, proceeding through Sarmiento Channel in the vicinity of Peel Inlet, the steamship *Spithead* passed ice, in the form of small bergs, some as large as 20 feet long and 12 feet high, but these were easily avoided. Later, in Concepcion Channel, it became necessary to reduce speed, as the quantity of ice became greater, until the vessel was finally stopped and hove to for the night. Next morning the ice was discovered to extend in a thickly packed field as far as could be seen ahead; the ship was put about and proceeded to the open sea through the Gulf of Trinidad.

The presence of ice in the channels above mentioned is of rare occurrence, but ice is frequently met with in Wide Channel.

**Supplies.**—The only food supply that can be depended upon with any certainty is mussels. These are to be obtained everywhere, and are very good of their kind. In the summer a few berries may be picked up or bought from the Indians when they are met with. Fish are in abundance, but it is very difficult to find a beach on which to haul the seine. With a trammel net they may be taken in most of the quiet coves.

The evergreen and antarctic beeches are almost the only kind of tree, covering the mountain sides everywhere from the water's edge to a line several hundred feet above. Among these is a thick, tangled undergrowth growing from a soft, spongy moss, treading on which one sinks to the knees. For steaming purposes the wood found in the northern parts of these channels is better than that found in the south.

**Straggler Islands** are a cluster of small islands lying in the western part of Beaufort Bay, between Tamar Island and the entrance to Smyth Channel, in steering for which the islands must be left to starboard. The western islands are low and small, 40 feet being the height of Boston Island, the northwestern of the group, and off which rocks and kelp extend ¾ mile.

When visible, Mount Joy, a long, flat-shaped hill on the west side of Smyth Channel, just open west of Fairway Island, bearing 22°, will lead to the entrance of Smyth Channel. See below, under Smyth Channel.

**Sholl Bay,** northeast of Cape Phillip, the western entrance point of Smyth Channel, may easily be recognized, as Cape Phillip and St. Agnes Peak, the latter rising 1,600 feet and terminating in a sharp conical point, are excellent marks. Although in this bay the anchorage is confined and it has several outlying rocks, vessels are secure when inside, and it will be found an advantageous stopping place for steamers proceeding through Smyth Channel.

Nearly ¾ mile southeastward of Point Henry, the south point of the bay, is Flat Rock, 5 feet above high water, but this will not be distinguished until it is open of Cape Phillip. As the shoal water off it extends more than a mile to the southward, care should be taken to sight the rock before closing the land too much.

Northward of Flat Rock, at 800 and 1,200 yards, are two detached rocks just awash at high water, with shoal ground ½ mile beyond them to the northeastward, and 1 mile 90° from Flat Rock is a 4¾-fathom patch named Freycinet Reef. Foul ground extends ½ mile south-southeastward of Freycinet Reef, but nothing less than 10 fathoms was found. Flat Rock should not be approached within 1¼ miles on its eastern or northern side.

**Directions.**—After rounding Tamar Island, steer north (true) for 4 or 5 miles, as with the prevalent strong westerly winds a vessel

is liable to be set to the eastward, then steer 22° until St. Annes Peak is distinguished, when keep a point to the eastward of it until the other features of the land can be made out. Off Robert Point (the north point of Sholl Bay) is a group of small rocky islets, which may be steered for on a 348° bearing until within ½ mile of them, when a larger islet (Moss) westward of Robert Point will appear; then keep close along the shore of Moss Islet until its western extreme bears 61°, distant 300 yards, which is the best anchorage for a large vessel. A small vessel may feel her way farther in. There is a channel into the bay from the southward inside Flat Rock, but it has not been examined. In calm weather it would be necessary to moor here, but with westerly winds single anchor with a long scope of chain is preferable.

The williwaws over the land blow with terrific force, but the water is perfectly smooth, and the *Nassau* rode out two very heavy gales in this bay at single anchor. In an easterly gale vessels should not go into Sholl Bay, as it is perfectly open, but should either run out of the Strait before it or stop at Port Churruca.

Kelp has grown up in Sholl Bay since the *Nassau's* survey, and it is difficult to get in to the anchorage without passing through some of it.

**Tides.**—High water, full and change, in Sholl Bay is at 11h. 45m.; springs rise 6 feet.

### SMYTH CHANNEL.

Smyth Channel extends 45 miles in a general northerly direction to Victory Pass and then 30 miles northwesterly into Nelson Strait.

**Appearance of the land.**—On the western shore of Smyth Channel, at about 2½ miles north of Cape Phillip, is St. Annes Peak, mentioned above, under Sholl Bay. St. Agnes Peak, about 2 miles eastward of St. Annes, has a rounded top and is 1,064 feet high. Mount Joy, 1,426 feet, 5½ miles northeastward of the latter peak, has a flat summit, and when seen from abreast Straggler Islands appears divided into three parts by two small notches, the western side of the summit appearing a little higher than the eastern.

**Fairway Islets** can be seen in clear weather a distance of 10 miles; the largest is so much higher than the others that they only show when open of it. There are four peaks, which are well defined when either northward or southward, the highest being 115 feet.

**Lynch Rock,** lying a little more than 600 yards from the north extreme of the largest Fairway Islet, is awash at low water. The kelp extends from the islands almost to the rock.

**Deep Harbor,** the first anchorage on the western shore of Smyth Channel, at 3 miles northward of Fairway Islets, is of very little

service to vessels of the present day. The entrance is ¼ mile wide and the anchorage about ½ mile within the first head off the entrance of a lagoon, in 30 to 35 fathoms. On entering there is a kelp patch on the starboard hand, and the shore is fronted for a short distance by rocks.

**Viel Islands** are on the east side of Smyth Channel, 3 miles northeastward of Fairway Islets. When seen from the southward they appear as one only, high at the north extremity and terminating in a low point at the south; when abreast Deep Harbor the several islands forming the group can be distinguished.

**Three Peaks Island,** on the western shore, abreast the center of Viel Group, is small but remarkable, showing on some bearings three distinct peaks, the highest of which is 60 feet.

**Burgoyne Bay,** 4½ miles northeastward of Deep Harbor, and on the opposite shore, affords anchorage, and is easily accessible to vessels of moderate length. Hugh Head, a barren height 200 or 300 feet high, over the north side of the bay, marks its entrance.

A 5-fathom spot, marked by kelp, lies in the middle of the bay about 500 yards from the entrance, and should be passed on its southern side, as the kelp off the southern shore is also easily discernible.

**Rocks.**—A pinnacle rock, with 1½ fathoms feet over it, lies on the 5-fathom shoal shown on the charts southward of the 40-foot island, Burgoyne Bay.

About 150 yards 85° from this rock is a shoal with 16½ feet over it and 150 yards 126° from the same rock is another pinnacle with 1½ fathoms over it. This rock is close to the range recommended in entering the bay.

The rocks are indicated by kelp.

**Directions.**—A conspicuous peak on the west shore of Smyth Channel, in line with the north extreme of Southwest Point, bearing 290°, leads between the shoal of 1½ fathoms and that of 16½ feet.

Good anchorage can be obtained at the head of the bay in 18 fathoms, mud, between a rock about 4 feet high, which lies off the northern shore, and an islet about 15 feet high in the southeast corner of the bay.

The southern shore near the head of the bay is steep-to, and if required a vessel can haul her stern in.

Two rocks, which nearly cover at high water, lie about 100 yards off the northeast shore of the bay.

Water may be obtained.

**Green Islands,** 5 miles northward of Deep Harbor, may be recognized by their green appearance against the barren background of Renouard Island.

**Pylades Bay,** on the east side of the channel, abreast Green Islands, has anchorage on the southern shore, between two islands, the northern one of which appears as a promontory; the depth is 16 fathoms, with good holding ground. The head of the bay is sheltered from all winds except those from the west. A shoal of 9 feet extends from the southern shore, rendering that part only fit for small vessels.

**Renouard Island,** about a mile from Green Islands, is high, rugged, and barren, with two peaks 850 and 650 feet high. The higher or western peak is not so well defined as the eastern one. Prain and Buckley Points, on the east side of the island, are low, but show out well against the land of Sivel Promontory and Simpson Island, north of it.

**Antoine Bay,** on the eastern shore, 1½ miles north of Pylades Bay, has no danger in it, but there is no room for anchoring except by going to the head of the bay and making fast to the shore.

**Sivel Promontory,** just north of Antoine Bay, appears to form part of the islands Renouard and Simpson when viewed from the southward.

**Wreck.**—The British steamer *Hazel Branch* lies wrecked on Adelaide Patch, northwestern side of Sivel Promontory. The wreck is broken in two amidships and the afterhalf is sunk.

**Goods and North Bays,** on the western shore, abreast Renouard Island, are both unfit for long vessels, as indeed are all the anchorages between Sholl Bay and Otter Ridge, and a vessel going northward should not pass Tamar or Sholl Bay without being sure of reaching Otter Anchorage.

**Directions.**—Renouard Island may be passed on either side, but the eastern passage is preferable; then between Shoal Island, just off the extreme of Sivel Promontory, and Evans Group; between Richards and Simpson Islands; 348° leaving Pearse and Alert Rocks and Shearwater Islets on the starboard hand. From Cape Colworth until Otter Islands are approached there is no danger. On rounding the west side of Shoal Islands give them a good berth, as the tidal currents sometimes set strongly toward them.

Vessels from the north should steer for the largest of the Adelaide Islands until Shoal Island Beacon is plainly visible.

**Beacon.**—A white pyramidal beacon, surmounted by a conical topmark, is erected on the highest part of Shoal Island.

**Evans Group** is midway between Renouard and Richards Islands, the highest being 60 feet. They are barren and of a whitish color, with kelp off their eastern extremity, outside of which the water is deep.

**Simpson Island,** on the eastern shore, north of Sivel Promontory, has a well-defined peak 726 feet high, showing above the range of hills extending from north to south of the island.

**Adelaide Islands** lie about ¾ mile off the western shore of Simpson Island and are surrounded by kelp.

**Isabel Island,** off the northwest point of Simpson Island, is small and of a whitish or gray color; it has a fringe of kelp along its western side, with several small islets between it and Simpson Island.

**Richards Island** has several small rocks along its eastern side, with a remarkable islet close to Cape Henry. It is rugged and barren, and of the same grayish color as nearly all the land in the vicinity. Approching this island from the north, the two hills (349 and 435 feet) near its north and south extremities have the appearance of two hummocks.

**Shearwater Islets,** about 1 mile from Richards Island, consist of five small islets, with several rocks between, well marked by kelp, some awash and some above water. These islets, apparently not over 30 feet high, form a good mark, when seen from the north, for pointing out the position of Alert and Pearse Rocks; they appear peaked when first seen from abreast of the Sparkes Islands.

**Pearse Rock,** lying 600 yards southwest of Shearwater Islets, is small and awash, surrounded by kelp, and sometimes difficult to distinguish. A good berth should be given it when passing.

**Alert Rock,** lying about 600 yards northwest of Shearwater Islets, has three heads showing above water, with a fringe of kelp around it.

**Beacon.**—A square, pyramidal beacon, lower half openwork, upper half covered with slats, painted white, with a cylindrical topmark, stands on Alert Rock. The top of the beacon is 29 feet above high water and 22½ feet above the rock. It is to be replaced by a beacon, conical in shape.

If the weather be thick, and Alert Rock has not been made out, close the land north of Cape Colworth, or stop the engines until the weather clears.

**Retreat Bay,** on the western shore, is large and well sheltered, but the water is too deep for a good anchorage, no bottom being obtainable at 30 fathoms until so close to the shore that a large vessel could not swing.

**Hose Harbor,** on the eastern shore, abreast the above bay, is entered through a long narrow passage, and looks most tempting at first sight, but is useless on account of its depth.

**Tandy Bay,** on the eastern shore, under Dashwood Point, has anchorage for small vessels on its northern side in the kelp, but both it and Oake Bay on the west shore are so near the better anchorage of Otter Bay, or Ridge, that it would be rarely necessary to make use of them.

**Dashwood Point** is the termination of a high range of hills gradually sloping down to the water on the east side of the south entrance to Mayne Channel, and is easily recognized when approaching it from the south. A rock barely awash at half flood lies about 40 yards from the point.

**Connor Islands** are nine in number, the largest of which is only 49 feet high and 200 yards across. They are dark colored, and from the southward look like several small haycocks. These islands are excellent marks for Otter Bay and the channels. On the southeastern islet is a conspicuous bush.

**Connor Shoal,** with 12 feet of water over it, lies 500 yards 108° from the northeasternmost of the Connor Islands.

**Buoy.**—The rock is marked by a black can buoy, with CONNOR on it in white letters, and surmounted by a black cylindrical topmark, moored close eastward in 5 fathoms.

**Otter Ridge.**—A narrow ridge, about 200 yards broad within the 10-fathom contour line, and having depths of from 6½ to 9 fathoms, extends from Dashwood Point to the southern edge of the bank, which extends south from Bedwell Island.

Shoals of 3¾ and 4¾ fathoms are situated on this ridge at 300 yards and 800 yards, respectively, northwestward of Dashwood Point.

**Otter Anchorage.**—The *Solace* anchored on the ridge in 7 fathoms, and on weighing, the starboard anchor came up with the ball broken off one end of the stock, and the port anchor with no stock at all. Small vessels should anchor in Otter Bay and large vessels somewhat off the bearings laid down on the chart, in from 12 to 16 fathoms, easing down their anchors.

**Otter Islands** consist of five islands and several small islets separating Mayne and Gray Channels at their south entrances. The largest is Campbell Island, 187 feet high and ½ mile long north and south. Most of the islands are covered with small trees of stunted growth.

As Otter Islands are neared from the southward Connor Islands will show on the port hand and the summit of Campbell Island will be seen over the lower land of the island in front of it.

**Otter Bay,** formed by the three southernmost Otter Islands, has very good anchorage in 6 to 7 fathoms, well sheltered, but confined for a large vessel. When entering the bay the eastern shore of Cunningham Island should be kept aboard until well inside, then two or three small islets will open on the starboard hand, and the boat channel to the northward between Cunningham and Campbell Islands will also open. As soon as the small islets are seen steer for them, and anchor when the southwest extremity of Campbell Island is in line with the northeast extremity of Cunningham Island.

On account of the increased growth of kelp the pilots for these channels do not take heavy draft vessels into the anchorage, but anchor them on the ridge south of Bedwell Island. In standing in for this berth, keep the west point of Bedwell Island and the highest point of Campbell Island in range.

**Mayne Channel,** about 8 miles in length, leading eastward of Otter and Summer Islands, though shoaler than Gray Channel, is generally preferred for vessels not drawing more than 25 to 26 feet.

The shoal spots on the ridge between Summer and Long Islands are of doubtful existence, but care should be exercised in passing this point, as this shoal seems to be silting up, 10 fathoms being the least depth shown on an old chart.

See Directions, page 398.

There is no ship passage between Otter and Summer Islands. Most of this part dries at low water.

The western shore along this part of Smyth Channel is high and steep, but the eastern shore is very low as far as the base of Mount Burney, which is 5,800 feet high and always covered with snow.

**Bradbury Rock,** about 6 feet above water, lies 3 miles within the south entrance of Mayne Channel on the east side of the track; the rock appears when seen from the north, wedge-shaped and dark, the high part of the wedge being to the eastward. Rocky heads, marked by kelp, extend southeastward from the rock for over ¼ mile.

**Beacon.**—A wooden tripod beacon, 16 feet high, painted white, stands on Bradbury Rock. The upper part of the beacon is covered with laths.

**Shoals.**—Barrie Shoal, with 5 fathoms over it, lies 1,450 yards 280° from Bradbury Rock.

Two shoals, both marked by kelp, lie southeast of Summer Island. The southern, 1,200 yards 162° from Henderson Point, has a depth of 3¾ fathoms over it, and the northern, 950 yards 157° from the same point, has a depth of 2 fathoms.

**Summer Island,** on the west side of Mayne Channel, is 124 feet high, with two islets about 200 yards from the north shore of the island. From Henderson Point kelp extends for ½ mile, and with the kelp extending from Long Island on the opposite shore forms the narrowest part of the channel. The deepest water is near the Summer Island kelp.

**Buoy.**—A red buoy is moored in 31 feet water, about 75 yards westward of the usual track for vessels, on the edge of the ridge which extends from Summer Island to Long Island. This buoy lies close northward of a 3¼-fathom spot. See under Mayne Channel.

**Caution.**—The buoys and beacons in the Patagonian Channels are not to be depended upon.

**Marchant Rock,** visible at low water, and surrounded by an extensive bank of kelp, lies 1,900 yards 342° from the summit of Summer Island.

This rock is marked by an iron mast or rod 13 feet high, painted in red and white bands and surmounted by a topmark 3 feet in diameter.

**Hartwell Bay,** eastward of Otter Islands, may afford anchorage among the Hartwell Islands and in Maraxxi Cove to the eastward, but these places are too far from the track of vessels to be useful.

**Munoz Gamero Bay,** eastward of Long Island, has a small settlement consisting of three houses and some coal sheds, known as Port Ramirez, situated on its northern shore. Anchorage can be obtained in from 16 to 19 fathoms water, sandy bottom, at about 600 yards offshore abreast the settlement; farther out the depth increases rapidly.

Herrera Point, to the southward of Port Ramirez, is the south entrance point of the bay. Four hundred yards to the northward of the point is a rock with only 1 fathom water.

**Bannen Channel,** the passage east of Long Island, is contracted nearly midway to about 200 yards wide by Alcerreca Bank, which extends from the eastern shore.

Casma Shoal, which lies about 600 yards 125° from Istmo Islet, at the south end of Long Island, has 3¼ fathoms at its southern extremity. From this point a ridge extends in a 25° direction toward Dolores Point, with several shoal heads of less than 3 fathoms.

**Long Island,** on the east side of Mayne Channel, is 3½ miles long and ¾ mile across at its widest part. A range of hills of a red color extends from the south point to about ¾ mile from the north point; the highest hill, 613 feet high, is in the southern part. The island is barren with the exception of Green Point, at the north, and the coast close to the water's edge, where there are a few stunted trees or bushes. After passing Summer Island, Long Island should not be approached nearer than ¾ mile.

**San Juan Shoal** extends off the western shore of Long Island to a distance of ⅜ mile, and has depths of 1 to 1½ fathoms.

**Buoy.**—A red conical buoy, surmounted by a staff and globe, marks the western edge of this shoal; but it is frequently dragged out of position.

Abreast a narrow projection 200 yards southeast from Green Point and about 20 yards from the shore lies a reef (dry at low water) having a shoal marked by kelp extending ½ mile in a northeasterly direction. From Peligrosa Point a shoal marked by kelp extends in a southwesterly direction, and apparently joins the shoal extending from the reef near Long Island. There is, however, between these shoals a channel 400 yards wide, with 10 fathoms water in the center and 4¾ fathoms on either side.

**Directions.**—A vessel bound northward through Mayne Channel will first obtain soundings on the ridge, and after crossing it the water deepens until the bank between Summer and Long Islands is reached. The channel over this bank lies midway between the two islands and has in it 3¾ to 4½ fathoms water.

As Bedwell Island is passed Bradbury Rock will show, and when passed it should be brought right astern, bearing 157°, and the ship steered 337° until the shoal water between Summer and Long Islands is past. After passing the narrow part of Mayne Channel, to avoid the shoal ground off Long Island steer for Baverstock Peak until the summit of Cutler Island is in line with the gap in the hills made by Isthmus Bay, bearing 16°, and keep the mark on until Green Point bears 101°. Going south the northernmost of the Francis Islets off Fortune Bay, or Roget Head, if the former can not be seen, should be brought right astern, bearing 337°, and a 157° course steered for the shoal water until within about a mile of Bradbury Rock, when a vessel should haul to the southward, so as to pass midway between the east side of Bedwell Island and Dashwood Point, keeping Bradbury Rock in line with the southeast extreme of Long Island, bearing 29°.

**Gray Channel,** leading westward of Otter and Summer Islands, is deeper than Mayne Channel, but narrower and more intricate; in fine weather, however, a vessel may, now that it is buoyed, pass through it in safety. The kelp, which marks all the dangers, is only visible at slack water. The tidal currents are very strong in the channel, and in general follow the direction of the axis. Between Hoskyn and Orlebar Islands a velocity as great as 5 miles an hour has been noted.

**Beacons and buoys.**—A white beacon, surmounted by a red staff and cone, the top of which is 33 feet above high water, stands on Pollo Rock, situated 900 yards to the southwestward of Cunningham Island.

A 16-foot patch lies outside the kelp 300 yards to the northward of Pollo Rock.

A black can buoy, marked "Connor," with staff and cage, is moored in 5 fathoms close eastward of a 13-foot rock lying 500 yards 107° from the northeasternmost of the Connor Islands.

A black can buoy, marked "Pollo," with staff and cage, is moored in 5½ fathoms on the eastern side of a 3¾-fathom patch lying southeastward of the Vereker Islands, with Pollo Rock bearing 147°, distant 850 yards.

A red conical buoy, marked "Gray," with staff and conical topmark, is moored in 3½ fathoms on the western side of an 11-foot rock lying 600 yards 274°, from the southernmost of the Foley Islands.

A black can buoy, marked "Vereker," with staff and cage, is moored in 6 fathoms on the eastern side of a rock nearly awash at low water, lying 0.6 mile, 126°, from the north point of the largest Vereker Island.

A white pyramidal wooden beacon, 22 feet in height, stands on the summit (141 feet) of Hoskyn Island.

A rock, with 19 feet water, lies nearly 400 yards to the southward of this island.

A black can buoy, marked "Orlebar," with staff and cage, is moored in 4 fathoms to the southeastward of the rock awash, lying 950 yards, 278°, from the beacon on Hoskyn Island.

A red conical buoy, marked "Theben," with staff and conical topmark, is moored in 5 fathoms on the northwest side of a 19-foot rock, lying 600 yards, 302°, from Hoskyn Island beacon.

An Iron-pole beacon, painted white, surmounted by a white spherical cage, 5½ feet above high water, stands on Cutter Rock (awash), situated off the eastern short of Orlebar Island in the northern approach to Gray Channel.

**Diaz Rock.**—A rock, with a depth of 3¾ fathoms, is situated on the western side of Gray Channel, in a position from which the small islet at the northern extreme of Vereker Group bears 268° distant 900 yards; it is steep-to and lies 500 yards westward of the track recommended.

**Directions.**—The track shown on chart should be followed, leaving the shoals marked by red buoys with conical topmarks on the starboard hand, when bound from south to north, and those marked by black buoys with cages on the port hand.

**Caution.**—The buoys in this channel should not be relied on.

**Fortune Bay,** on the southeast side of Baverstock Island, is a fair anchorage for a small vessel, but too confined for a large one. Keep Low Island to the northward and take care, both on entering and leaving, to give Adeona Rock a wide berth, as the kelp extends a long distance off it.

**Low Island Beacon.**—A small beacon has been erected on Low Island, Fortune Bay.

**Cutler Island,** 248 feet high, has very high conspicuous land rising in a conical form from a small hummock near the east side and sloping to a point at the northwest extremity. The north side appears well wooded, while that of the west is barren and of a white color.

**Sim Rock** lies close to its southeast side, and there are two islets near the northern extremity.

Cape Palmer, the southeast point of Rennell Island, is low, covered with small trees, and has several flat-topped islets off its ex-

tremity; within the low point forming the cape the land rises to a considerable height.

**Isthmus Bay,** in Zach Peninsula, on the east side of the channel at 3 miles north of Cape Palmer, is one of the best anchorages in the channels; the bay is perfectly safe for the largest vessels. On the western side are several reefs, but they are all marked by kelp, and Labouchere Rock breaks when there is any sea. By keeping on the eastern side, the passage will be found perfectly clear, and a vessel may select almost any depth for anchoring.

If deemed not desirable to proceed far in, after passing 300 yards off Trivett Point, and steering 11° for ½ mile, good anchorage will be obtained in 20 fathoms, mud, with Selfe Point, the west entrance point, bearing about 259°; or if preferred, 200 or 400 yards farther in on nearly the same course. The most secure anchorage, however, is in 14 to 16 fathoms, sand, in the inner bay.

Depths of 29 and 35 fathoms have been reported in the outer anchorage where the chart shows 20 fathoms.

**Beacon.**—An iron framework pyramid, 33 feet high, surmounted by a globe, 3 feet in diameter, the whole painted white, stands close westward of Selfe Point.

**Buoys.**—Labouchere Rock is marked by a black buoy, with black cylindrical topmark moored on its northeastern side in a depth of 6½ fathoms. Mallard Reef, the northernmost of the dangers on the west side of the entrance, is marked by a similar buoy, moored on its eastern side in a depth of 5 fathoms.

These buoys must not be relied on.

A shoal lies about 150 yards to the westward of Mallard Reef.

**Mallet Bay,** at the head of Isthmus Bay, is too shoal to be of much use. From its head there is a canoe portage across to Oracion Bay, a distance of over 200 yards. Both wind and sea sweep into Oracion Bay with considerable force, so that anyone crossing this neck can get a good notion of what the weather is in the channel, while the vessel is lying quietly in Isthmus Bay. The chart must be the guide into this bay.

The same applies to Welcome Bay, and Port Mardon, its inner basin on the western shore of the channel.

**Sandy Bay,** on the eastern side of the channel, at 3 miles north of Isthmus Bay, affords anchorage by passing southward of a long patch of kelp, with 4 fathoms on it, which extends from the northern point nearly in line with the south point. Within this there are 18 to 20 fathoms, but for a large vessel it is not recommended.

**Inlet Bay,** on the west side of the channel at about 3 miles north of Welcome Bay, also affords anchorage, but with Isthmus Bay so near these bays are hardly required.

**Island Bay,** on the western side of Hunter Island, is said to offer good anchorage both to the northward and southward of some islets which lie off it.

**Hamper Bay,** at the southwest end of Piazzi Island, has also anchorage in 7 to 15 fathoms. It is shown on the charts as a channel between Piazzi and Hunter Islands, but it is reported to be almost a closed bay, narrower than indicated by the charts, and strewn with islands, admitting of passage for small vessels only. This part of Smyth Channel widens to 3½ miles, but at 6 miles farther on, near Ceres Island, it narrows to 2 miles; hence to the mouth of the channel, where strong northwest winds send in a heavy sea, no anchorage is known, but a small vessel in want of shelter would no doubt find some by sending a boat in search.

**Victory Pass,** between Zach Peninsula and Hunter Island, connects Smyth Channel with Collingwood Strait and Sarimento Channel on the north, and Union Sound to the southeast.

**Brinkley Island,** situated on the east side of Victory Pass, at 1¾ miles north of Zach Peninsula, has a high well-defined peak near the southeast end, sloping toward the northwest; the island is of a brownish color, with a few stunted trees on it.

**Bessel Rock,** about 10 feet above water, lies nearly midway between Zach Peninsula and Brinkley Island, and is quite out of the channel.

**Cloyne Reef,** on the west side of Victory Pass, abreast Brinkley Island, is a circular rocky shoal, just awash and thickly covered with kelp. With strong winds the sea breaks heavily upon it, but in thick weather it may not be made out until close upon it. As the shore of Brinkley Island is steep-to a vessel should steer for it until the reef is made out and then pass between it and the island. The passage between it and Hunter Island is only 600 yards across, but when the reef is in sight the passage is safe, and with a low-powered vessel, if the wind is down the channel, it is advisable to keep that side so as not to be set farther to leeward than necessary.

A spindle is erected on Cloyne Reef in place of the beacon formerly marking it.

**William Bay,** on the east side of Hunter Island, is well sheltered and affords a good stopping place for boats, but there is not room in it for a vessel of any length.

**La Place Islands,** off the southeast point of Newton Island, are a group of low flat-topped islands covered with bushes and trees. The largest, La Place Island, forms the eastern side of the north channel to Dixon Cove.

**Dixon Cove,** between the south end of Newton Island and La Place Islands, is about 500 yards in extent and has a passage in and

out at either end. It is much more sheltered than Columbine Cove, and its only objection is the depth of water, the anchorage being in 24 fathoms, but the holding ground is good, consisting of clay, sand, and mud. Coming from the southward, this cove opens as soon as Ross Point (Hunter Island) is passed, and Catalina Island may be passed on either side; coming from the northward, follow the coast of Newton Island for the opening, which will appear between it and the largest of La Place Islands, and enter the cove from the northward. If the usual northerly wind be blowing with any force, however, it will be better to pass eastward of the La Place group altogether and enter the cove from the southward, head to wind.

**Columbine Cove,** 3 miles northward of Dixon Cove, is the next anchorage. Ward Peninsula, which forms the north side of the cove, is a rocky knob joined to the mainland by a sandy neck covered with trees. It is fairly sheltered, but at times the williwaws down the steep mountain side over it are furious. When blowing hard, a vessel should not anchor in the cove, the best berth being in 15 to 16 fathoms water a little outside a line joining Powlett and Slader Points. Excellent wood for steaming purposes may be obtained.

**Shingle Road,** on the north side of Ward Peninsula, affords anchorage under the northern point in 18 fathoms, and a little farther out in 25 fathoms, but with very little shelter.

**Union Sound** leads from Collingwood Strait to the Ancon Sin Salida (or No Thoroughfare Cove) of Sarmiento, and thence through either Kirke or White Narrows to Obstruction Sound and Last Hope (Ultima Esperanza) Inlet; the former of which is at its nearest point only separated from Skyring Water by a low isthmus 400 yards in breadth.

**Port Condor,** situated within the entrance of Eberhardt Arm, a shallow estuary on the northern shore of Last Hope Inlet, at a distance of 70 miles from the main strait, is the site of a small settlement. It can only be reached by vessels drawing not more than 6½ feet. The tidal streams in the Kirke and White Narrows are said to attain, at springs, a velocity of 9 to 10 knots; vessels should not attempt these narrows excepting with a fair tide.

It is high water, full and change, in the Kirke Narrows at 0h. 37m., but the time is very irregular, being much affected by local circumstances.

**Ports Prat and Consuelo** are situated in Eberhardt Arm, at 1 and 2½ miles, respectively, above Port Condor. Vessels visit these small ports to embark wool from the estancias in the district.

Beacons have been erected in White Narrows and in the approach to Last Hope Inlet. The entrance to Eberhardt Arm is marked by buoys.

**Bordes Shoal,** ½ mile in extent, with 2¼ fathoms of water, lies 1½ miles 260° from Crater Cape. A red conical buoy with a conical topmark has been moored 400 yards from its northeastern extremity.

A rock with a depth of 3 fathoms is situated between Bordes Shoal and Crater Point, with Ano Nuevo Island bearing 157° distant 3 miles.

Vessels should pass westward of Bordes Shoal and this rock.

**Morla Channel,** southward of Cape Gray, connects Canal of the Mountains with Santa Maria Channel; it is free from dangers and the tidal streams present no difficulty to navigation.

**Santa Maria Channel** is free from dangers, and Port Condell, on the western side, affords good anchorage.

**Vicente Island,** 105 feet high, bare and yellow, is situated at the northern end of the eastern side of Santa Maria Channel.

**Wilson Island,** of the same height, but less easily recognized, is situated west-southwestward of Vicente Island. A shoal of 16 feet extends from the southeastern extreme of Wilson Island.

The track lies in mid-channel between Vicente Island and Wilson Island.

**Fernandez Vial,** the western of the two small islands in mid-channel, northward of Port Condell, has a clear passage on either side.

The easternmost of these islets has an isolated rock situated 200 yards northeastward of it.

**Kirke Narrows** has three islets in mid-channel, to the southward of which there is a channel with a depth of 11 fathoms.

A bank of 5 fathoms is reported to extend in a northeasterly direction from the point southward of these islets nearly to mid-channel.

**White Narrows.**—This channel is much obstructed by islets at the western end. The track passes between the two western of these and northward of all the others. At about the middle of the channel the direction turns sharply to the northeastward.

The eastern entrance is also obstructed by many islets, the channel, 200 yards broad, being situated close to the north point of Portales Island, which separates Kirke Narrows from White Narrows.

**Beacons.**—A white stone pyramid, 147 feet high, surmounted by a staff and red conical basket, is erected on the summit of Huerta Island, the northern of the group of islets at the western entrance.

An iron post surmounted by a red conical basket is erected on a rock which uncovers at low water, situated close eastward of this group.

A white beacon 72 feet high is erected on the south point of Direccion Islet at the eastern entrance of White Channel.

A white wooden pyramid 88 feet high is erected on Salustio Islet 1 mile eastward of Direccion Islet.

**Port Pinto.**—This extensive and sheltered port is situated in White Narrows, where the channel trends to the northeastward. It affords good anchorage in a depth of 8 fathoms, sand and stones bottom, with good holding ground.

Fresh water is easily procured.

**Almirante Montt Gulf.**—This gulf, which is entered from the westward through Kirke Narrows or White Narrows, is deep on the western side, but has depths of 11 fathoms and less eastward of Focus Island.

**Focus Island,** 374 feet high and steep on the western side, is situated in the center of Almirante Montt Gulf. A group of three islets extends ¾ mile from its southern extreme and rocks with a depth of 13 feet extend 2 miles southeastward from the island, almost closing the channel between it and the mainland.

**Shoal.**—A shoal, with a depth of 23 feet, is situated close southward of the center of the passage between Focus Island and Coruña Islets.

**Anchorage.**—Good sheltered anchorage can be obtained 400 yards eastward of the center of Focus Island in a depth of 3 fathoms, sand and shell bottom.

**Channels.**—The passage northward of Focus Island is that generally used; that southward of the island is shoaler and must be navigated with caution.

Valdes Channel, at the south end of Almirante Montt Gulf, eastward of Kirke Narrows, is deep and free from dangers. On the eastern side of this channel Ladrillero Bay affords well-sheltered anchorage in a depth of 3 fathoms.

**Easter Bay,** situated on the western side of Almirante Montt Gulf, affords good sheltered anchorage in the southwestern part in moderate depths, sand bottom, with good holding ground. Care must be taken to avoid two shoals in the southern part of this bay, one of which, with a depth of 1½ fathoms, is marked by a buoy.

**Coruña Bay,** situated on the northern side of the gulf, affords spacious anchorage in a depth of 11 fathoms, mud bottom and good holding ground, sheltered from northwest and southwest winds.

A rock with a depth of 5 feet, marked by a beacon, is situated in the center of this bay.

**Port Riquelme,** situated on the western side of the estuary of Last Hope Inlet, has a moderate depth with mud bottom and good holding ground; it is sheltered from the prevailing winds.

The northern part opens into Delano Creek, which affords good sheltered anchorage for small vessels. The entrance to this creek must be approached with caution, as it is apparently shoal.

**Desengaño Bay** is a large unsheltered bay on the eastern side of the gulf.

**Lastarria Port.**—This port, situated westward of Desengaño Bay, affords the best and most extensive anchorage in Almirante Montt Gulf; the entrance is 1 mile broad and the bay recedes 3½ miles, affording sheltered anchorage in depths of from 3 to 5 fathoms.

**Bordes Point.**—This point is the western entrance point of the estuary of Last Hope Inlet; from this point Cisnes Islets, three small, low islets, covered with vegetation, extend to the northeastward.

**Beacon.**—A white wooden pyramid, surmounted by a black cylinder, and visible from a distance of 10 miles, is erected on the eastern of the Cisnes Islets.

**Baja Point** is a low, bare point situated northward of Bordes Point and marked on the northern side by a conspicuous black rock. This point should not be approached within a distance of 300 yards.

**La Forest Port,** between Bordes Point and Baja Point, affords sheltered anchorage in a depth of 8 fathoms, mud bottom, and good holding ground. Vessels should anchor when Baja Point comes in line with the houses at Port Bories on the northern side of the estuary.

**Guanaco Island** is situated at the entrance to Eberhardt Arm. Two small islands known as Lagartija and Rata are situated ¾ mile southeastward of Guanaco Island, being connected with the southeast point of that island by a sand bank, which covers and uncovers.

**Beacons.**—A wooden tripod, elevated 137 feet and surmounted by a white cone, is erected on the summit of Guanaco Island.

A black beacon, formed by a staff surmounted by a cylindrical top mark, is erected on a rock 200 yards north of Rata Island.

**Last Hope Inlet** extends 20 miles in a northwesterly direction from Guanaco Island and has steep cliffy shores; at the head it divides into two arms, in the southern of which is situated Port Bellavista.

**Port Demaistre.**—This small bay is situated on the eastern side of the estuary of Last Hope Inlet; it is ½ mile broad at the entrance and recedes about ½ mile, affording good but unsheltered anchorage in fine weather in depths of 3 to 4½ fathoms, sand bottom.

**Galpon Point,** northward of Port Demaistre, is a low point, on which is situated a zinc shed; a shoal extends a short distance southward from it.

**Port Natales,** at ¾ mile northward of Galpon Point, is marked by a house; the coast in this vicinity is fringed with rocks.

**Port Bories (Grosiria)** is situated 2 miles northwestward of Port Natales; it affords no shelter but vessels can anchor in a depth of 5½ fathoms, stones and mud bottom.

**Eberhardt Arm,** which joins Last Hope Inlet at Guanaco Island, is about 5 miles long in a north and south direction and ½ mile broad; it is shoal, having a depth of 1¾ fathoms at the entrance, increasing to depths of 3½ fathoms.

**Choros Point** is a low point, difficult of recognition, forming the eastern entrance point of Eberhardt Arm; shoal water extends ½ mile southward from this point, marked at its outer extremity by a red conical buoy, surmounted by a red conical top mark. There is a channel about 400 yards broad between this buoy and Lagartija Island.

**Jarmon Point** is the western entrance point of Eberhardt Arm; it is high and easily recognized by having large bare spaces upon it. A shoal, the outer edge of which is marked by a cylindrical black buoy, surmounted by a cylindrical top mark, extends southeastward from this point to mid-channel.

**Port Condor.**—This small bay, situated on the eastern side of Eberhardt Arm, affords anchorage in a depth of 2 fathoms at about 200 yards southwestward of the mole.

A warehouse and hotel are situated in this port.

**Port Prat,** situated 1 mile north of Port Condor, affords good sheltered anchorage over a small space in a depth of about 4 fathoms, mud bottom.

**Port Consuelo.**—This port is shoal, and open to the southward; vessels anchor outside the port westward of the west entrance point in a depth of 2 fathoms. There is no pier.

In approaching Port Consuelo vessels pass between two buoys situated southward of Kruger Island.

Eberhardt Arm extends about 3 miles above Port Consuelo.

**Barometer.**—In these inland waters the atmospheric pressure is relatively high as compared with that over the outer sea, the barometer usually falling with fine weather and rising with a sudden change of wind from west to southwest.

**Weather.**—The prevailing winds are those from southwest and west, the latter direction being more common in summer. Calms are seldom experienced. Rain is frequent in summer, especially in January, when much cloudy weather prevails.

**Tides.**—The height of tides and direction of tidal streams are greatly affected by the winds.

### SARMIENTO CHANNEL.

This channel communicates with Smyth Channel through Collingwood Strait and Victory Pass, and stretches 70 miles to the northward between Piazzi Island and Staines Peninsula, thence to the eastward of Vancouver and Esperanza Islands to the entrance of

Peel Inlet, on the east side of the channel, where it unites with Esteven Channel, and both merge into the Inocentes Channel through Guia Narrows. From Collingwood Strait to Sarmiento Channel the passage takes a sharp turn to the westward for about 4 miles between Newton and Carrington Islands, but as St. Bartelome Point, the south extreme of Carrington Island, is steep-to, this bend need not be necessarily lengthened by keeping mid-channel.

In the southern end of Staines Peninsula is a large harbor, but the water is too deep for anchorage.

**Occasion Cove,** on the Piazzi Island east shore, at the foot of Alfredo Hill, north side of Lecky Retreat, affords anchorage in 13 fathoms, stone and shell, with Ramillete Islet bearing 90°.

The anchorage is, however, only fit for a stopping place in fine weather, and no other anchorage could be found in Lecky Retreat.

On the opposite side of the channel, just south of Lecky Retreat, there are two openings, but they appeared full of rock and kelp, without any promise of anchorage; and, as Skyring says that he and Kirke carefully searched that part for anchorage, it is to be presumed that none exists. There is a kelp patch off the northern of these openings which must be avoided; it lies about 246°, ½ mile from the northwest point of the inlet.

**Directions.**—Vessels proceeding into Occasion Cove should, when abreast Lecky Retreat, steer to pass between Titus Islets and Chatas Rocks, which extend 150 yards from the north side of entrance, thence for a high hill at the head of Lecky Retreat, bearing 226°, and after passing Ramillete Islet steer for Alfredo Hill, which will lead to the anchorage. In the kelp surrounding Titus Islets, 4¾ to 7 fathoms water were obtained.

A kelp patch is in mid-channel between Titus Islets and Chatas Rocks, upon which the least depth found was 6 fathoms.

About 3 miles north of Occasion Cove is a well-sheltered bay, with anchorage in 15 to 20 fathoms, mud. Two islets mark its entrance, and there is a large kelp patch and several rocks southward of it.

When entering, keep the northern shore aboard to avoid a small kelp patch nearly in the middle, and when in, hard-a-port and anchor in depth as above.

**Hamilton Point.**—About 7 miles north of Lecky Retreat, on the north side of Hamilton Point, there is a fairly sheltered bay that may be used as a stopping place. It is, however, rather confined and exposed to the northward, but affords anchorage in 7 to 9 fathoms, mud.

Between Lecky Retreat and Hamilton Point the shore is fronted by numerous islands.

**Double Peak Island,** midway between Capes San Mateo and St. Vincent, is a good mark for determining a vessel's position, espe-

cially at night, as it shows out well from the background. The two peaks lie in a northwest and southeast direction. The northwest peak, 960 feet high, is the higher of the two.

**Themis Inlet** is on the east side of Vancouver Island, 4 miles north of Don Pedro Point. Mr. Hanham, of the yacht *Themis*, anchored in this inlet inside the islets off the northeast point of it. He says: "Go south of the island and go easy, and a good anchorage will be found, taking care not to shut in the rocks south of the western point of the entrance."

**Evans Island Rocks.**—On the east side of the channel, 2¾ miles northward of Cape San Mateo, the south extreme of Evans Island, there is a rock that covers at high water about 200 yards offshore; also another on which the sea breaks, 3½ miles farther northward, about 200 yards offshore.

**Mayne Harbor,** on the eastern side of the channel, 5 miles northeast of Themis Inlet, has an inner and outer anchorage, of which the inner one is preferable, but both are safe and landlocked. The entrance is eastward of all the islands off its mouth. A vessel may anchor either in 13 or 14 fathoms of water in the outer bight, or go on to the inner one and select a berth in 7 or 8 fathoms, mud.

On the west side of the entrance to this port lies a rock having about 2 feet of water over it and 3½ to 4½ fathoms close around. From this rock the southeast point of Eclipse Island bears 210° distant nearly 200 yards.

A shelf with 13 feet of water over it, sometimes marked by kelp, extends 150 feet off Lecky Point, on the east side of the entrance to the outer anchorage. Vessels must be very careful to preserve a mid-channel course, to avoid not only the shelf, but also some detached spots off the islands. Wood for steaming purposes may be had in abundance.

Anchorage will be found outside the harbor between Eclipse Island and Richard Point, in 26 fathoms, sandy bottom, but without much shelter.

**Esperanza Island—Shoals.**—A shoal marked by kelp, with a depth of 6 feet, is situated off the east coast of Esperanza Island, Sarmiento Channel, in a position from which Edelmira Islet bears 340° distant 0.7 mile.

The Norwegian steamer *Hugin* touched on an uncharted submerged reef near Lucis Island. After being fast for about 15 minutes the steamer sank in deep water. The master affirms that he was in the middle of the channel between the high shores and exactly on the sailing line, as laid down on the charts.

A thorough search for the submerged rock has been made without success.

**Point San Marcos,** 15 miles northward of Mayne Harbor and 4 miles southeast of Puerto Bueno, may be known by a remarkable round-topped mountain with a cascade at the base, a little north of the point. The land between this point and Cape San Antonio, 10 miles farther on, is high nearly all the way.

**Delgada Point,** 2½ miles from Point San Marcos, has a reef with 3 feet least water and 16 to 22 fathoms close-to extending about 50 yards from it. Kelp is said to show at low water on this reef.

**Puerto Bueno,** 2 miles north of Delgada Point, is an excellent port, in which a vessel may find good anchorage in 8 to 9 fathoms, stiff blue mud, in the middle of the harbor or in 4 to 5 fathoms nearer the shore. It has an inner and outer harbor, both safe, the former, of course, more sheltered, as the outer harbor is exposed to the northwesterly squalls which come down with considerable violence, without, however, making up any sea.

The entrance is between Pounds Island and Hankin Point. A small vessel may enter between Hoskins and Pounds Islands, but there is little to be gained by going in that way, and Hecate Rock occupies an awkward position in this passage.

There is a large fresh-water lake just above the inner harbor which empties itself by a small cascade into a little bight at its head.

**Beacon.**—A beacon consisting of a slanting iron plate, painted in red and white bands, has been erected on Pounds Island. It is easily seen from the channel, either north or south.

On Paynter Island, and elsewhere about the shores of the port, are a number of signboards bearing ships' names.

**Schooner Cove,** just north of Hoskins Island, is adapted for boats or very small vessels; it has a sandy beach at its head.

**Bonduca Island,** near the center of the channel, 4 miles north of Puerto Bueno, is low, with two small iselts off its north end, connected with it by reefs a few feet under water. There is also a reef off the south end of this island, with a rock above water.

**Cocked Hat Island,** 1,500 feet high, lies 2½ miles northward of Bonduca Island, and a little farther northward is Goschen Island, also very high.

**Peel Inlet** connects Sarmiento Channel with Pitt Channel, which leads into San Andres Bay. The narrower and more westerly of the two channels between Peel Inlet and Pitt Channel is clear of shoals and easy of navigation, with depths in midchannel of from 20 to 22 fathoms. The shoals which make off the points are small and have no submerged rocks at their extremities.

Port Amalia, situated on the south side of the southern arm at the head of this inlet, is about 0.9 mile long and 600 yards broad, affording good sheltered anchorage in a depth of 15 fathoms, mud bottom.

An island is situated in the center of the entrance with a passage on either side, that to the southward being the deeper and broader.

**Shoal.**—A bank of stones, with a depth of less than 6 feet, extends about ½ mile from the northern entrance point to the southern arm.

**Cape Charles,** the southwest point of Chatham Island, is the most prominent of the many headlands in that vicinity. The cape is high, rugged, and barren. From abreast the cape the high north end of Esperanza Island will appear over the Isla de dos Canales on the west side of the channel, and Cocked Hat and Goschen Islands on the east side abreast Isla de dos Canales.

**Europa Point,** on the north side of Cape Charles, is low, but steep.

**Reported rock.**—A rock was originally reported to lie 243° ¾ mile from Europa Point, and indications of shoal water in that locality were again reported. This rock was not found by vessels which made a close examination of the neighborhood, and there is no satisfactory evidence of its existence.

**Latitude Cove,** on the west side of Sarmiento Channel, opposite Cape Charles, is nearly 200 yards wide at its entrance, with 14 to 17 fathoms water. About ½ mile within the entrance there is a small bay in which the deepest water is 22 fathoms, ooze bottom. At the head of this bay there is a beach, but the shores on either side are rocky and steep.

Entering Latitude Cove, keep toward the southeastern shore, where the water is deepest, and to avoid the rocks off Blanca Point when within the entrance steer about 238°, passing nearly 200 yards north of Elisa Point. On nearing this point a remarkable cascade will be seen on the north shore of the cove, between which and Elisa Point anchorage may be obtained in 18 to 20 fathoms water.

**Guia Narrows** are between Hanover and Chatham Islands, and connect Sarmiento and Inocentes Channels. They are 6 miles long and from 1 to 1½ miles wide, except at the north end, between Porpoise Point, low and sharp, on the west side, and Guard Island on the east, where the breadth is about 400 yards, but there is no danger, the shores being steep-to on either side. Sometimes the tide sweeps strongly around the point; therefore it would be advisable to keep nearer Guard Island in passing through.

**Ladder Hill,** 1,285 feet high at the southwest entrance to Guia Narrows, is conspicuous when approaching the narrows from either end, having the appearance of being cut in large steps.

There is a little cove under the hill in which the *Malacca* spent a night, but it is quite unfit for anything but a schooner or gunboat, and not good for these.

**Unfit Bay** is too deep for anchorage, but in fine weather a vessel can make fast to the shore by hawsers.

**Tides.**—High water, full and change, in Guia Narrows is at 2h. 10m.; springs rise 8 feet. The stream of the flood in the narrows runs to the eastward and the ebb stream to the westward at the rate of 2½ to 3½ knots an hour at springs. Strong overfalls exist on the ebb stream of springs just outside the western entrance of the narrows. North of these narrows the flood stream sets to the southward, while in Sarmiento Channel it sets to the northward.

### INOCENTES CHANNEL.

This channel commences at the Guia Narrows, and is 18 miles long to the north extreme of Inocentes Island, there it joins Conception Channel. The south side of the channel is formed by a succession of high cones sloping to the northwest and ending in the Clements Group. On the north side are three precipitous headlands with deep inlets between; the land then trends to the northward, and the foreground consists of islands rising to about 400 feet in height.

**Rayo Cove,** immediately southward of Porpoise Point, is a small and deep cove. When entering, the eastern shore must be kept aboard to allow room for rounding to. The anchorage is in from 27 to 33 fathoms, rocky bottom, and can not be recommended; shoaler water of from 5½ to 13 fathoms, sand bottom, will be found on the western side of the cove close eastward of some islands, but there is not room to swing.

**Port Ochovario,** on the northern shore nearly opposite Rayo Cove, is a narrow fiord between lofty mountains, useless for general purposes. An anchorage in 22 fathoms, coarse sand, can be obtained at its head, off a conspicuous bluff on the southern shore, but should only be used in case of absolute necessity.

**Paroquet Cove,** on the north shore at 2¾ miles west of Port Ochovario, affords anchorage in 30 fathoms, sand, but it is fit only for small vessels. The entrance may be recognized by three small islets off its eastern entrance point, and a rounded wooded hill at the head of the bay. The surrounding land is low and wooded.

**Juan Island,** on the north side of the channel at 1½ miles west of Paroquet Cove, will be immediately recognized as a double island, with a long low depression in the middle and forming a bluff point at its southern end.

**Wide Bay,** east of Juan Island, is deep and rocky, but well sheltered and useful to vessels bound north meeting with a strong head gale on rounding Juan Island. To enter it, the coast of Juan Island should be kept aboard to avoid Ramses Rock, lying in the middle of the bay with 5 feet water over it. When near the head the water shoals quickly from 40 to 20 fathoms, and anchorage will be found

with Green Islet, a small rocky islet 15 feet high, bearing 21°, and a low hill on the northeast part of Juan Island 289°. There is ample room in this bay for large vessels, but the bottom is rocky.

**Shoal.**—A shoal of 9¾ fathoms is reported to exist in this bay, in a position from which the center of Green Island bears 20°, distant 700 yards.

**White Rock,** 150 feet high, is the most westerly of the Ordnance Islands, lying at the entrance to a large inlet between Juan Island and Robert Island.

**Edwards Rock,** on the north side of the channel at 2½ miles from Juan Island, lies in a direct line between the southwest extreme of Juan Island and Wheeler Islets. Although it is reported as being awash at low water, the U. S. S. *Pinta*, in 1884, passed close to the position at half tide, and although a very heavy sea was running there was no breaking of the water to mark it. There is very little kelp over it.

**Robert Island,** at 2½ miles north of Juan Island, is double peaked, shaped like a saddle, and very conspicuous when seen from the northward. The southern and eastern coasts of Robert Island were searched for anchorage without success.

**Wheeler Islets** appear when approaching them from the northwest as one long islet covered with small trees, and are useful in thick weather in marking the entrance of Inocentes Channel, as they are often seen when the higher land is hidden. They lie 3½ miles eastward of Inocentes Island.

**Inocentes Island** is situated at the junction of Concepcion and Inocentes Channels; the southern extremity of the island is low and has several low islets and rocks lying off it. The land rises gradually from the south point to the northwest end, forming a flat ridge. The summit (Diana Hill) is a flat-topped hill 567 feet high, and is easily recognized from both north and south. Off the northeast side is a rock awash.

Small vessels may obtain anchorage during northerly winds in a bay at the south end of Inocentes Island; the depths obtained on approaching the bay were from 6½ to 14 fathoms. The German surveying vessel *Hyæne* anchored in 14 fathoms, sand and small stones, with Hope Island bearing 4° and the southwest point of Inocentes Island 286°. A small opening was found between the reefs, about 50 feet wide, having in it a depth of 13½ fathoms; these reefs, some of which dry at low water, are thickly covered with kelp; there are 3½ to 9½ fathoms in the bay.

**Infernet Rocks,** two rocky islets about 8 feet high and one rock awash, are situated 2 miles 291° from the south point of Inocentes Island. Vessels should pass on the east side of this island, as these rocks are very difficult to distinguish in thick weather.

**Caution.**—When passing through Inocentes and Concepcion Channels during thick weather it should be remembered that in the neighborhood of Inocentes Island the flood tide from the Pacific sets to the eastward directly across the track recommended.

**West Channel,** at 7½ miles westward of Inocentes Island, separates Duke of York Island from Madre Islands. The channel is narrow, but appears wide, owing to the land on the north side being very low. The sealers report the passage full of islets and rocks and unfit for navigation. At 3 miles within the eastern entrance an arm extends to the northward and joins Monteith Sound; it also probably communicates with a passage (Grove Sound) which was traced from Molyneux Sound 12 miles in a southwesterly direction.

**Caracciolo Bay,** on the north side of West Channel, 5½ miles westward of Anunciada Point, the northeastern extreme of Duke of York Island, affords anchorage in 14 fathoms, gravel bottom, in the center of the bay, and it is reported to be a safe refuge in bad weather.

**Port Morales.**—This port is situated on the west coast of Duke of York Island, southward of West Cliff; it is about 3 miles long and 1½ miles broad, trending in an easterly direction, and contracting at the head to an arm extending 2½ miles in a southeasterly direction, and about ⅓ mile broad.

The head of this arm is 2 miles from Shergall Harbor on the east coast, the isthmus separating them being easily traversed.

Sheltered anchorage is found near the entrance to this arm in a depth of 5 fathoms, mud bottom and good holding ground.

**Rocks.**—The northern approach of Port Morales, eastward from West Cliff, is much encumbered by rocks, and at 1 mile westward of the south entrance point is situated a rock which uncovers at low water; breakers have been seen southwestward of this rock.

**Directions.**—The port should be approached from the southward, and the dangers in the vicinity avoided by bringing a black rock on the northern side of the port in line with a cone, about 1,500 feet high, bearing 65°.

**Conejo Islet.**—This islet is situated about 1 mile northwestward of the northwest point of Duke of York Island.

**Reef.**—An extensive reef of triangular shape, part of which uncovers, extends between Conejo Islet and an islet situated about 4½ miles northwestward of it.

## CONCEPCION CHANNEL.

This channel separates the Madre Islands from the mainland. It commences at Inocentes Island and terminates at Brassey Pass, the junction of Trinidad and Wide Channels, a distance of 30 miles, with an average breadth of 5 miles in the southern and 2½ miles in

the northern part. On its west side are many inlets, but the only good anchorages are Molyneux Sound and Tom Bay. The *Alert*, when surveying, anchored in Port Bermejo, Monteith Sound, and in Walker Bay, and these served her purpose, but can not be recommended as good anchorages. Indeed, the southeast coast of Madre Islands south of Molyneux Sound should not be approached within a mile, except in case of necessity, as the soundings are very irregular and the coast studded with rocks and small islets. For a sealer and such small craft there are many useful berths in that part.

EASTERN SHORE.

**Artillery Bay,** situated 4½ miles northeast of Inocentes Island, contains several islands and rocks at its southwest end, of which Taylor Rock, 3 feet high, is the westernmost. No anchorage was found near them.

A navigable channel connects Artillery Bay with San Andres Bay; in it are two narrows 70 yards wide with depths of from 5½ to 7½ fathoms.

**Tapering Point,** about 4 miles northeast of Inocentes Island, is a long, low, and wooded point, with a depth of 150 fathoms ½ mile west of it.

**A patch** of 7 feet, marked by kelp, lies 342° distant 1¼ miles from Tapering Point, and 232° ½ mile from the western Chance Island. From it a bank having 15 fathoms least depth extends 1 mile southwest.

**Chance Islands,** 1¾ miles north of Tapering Point, being low and wooded, are difficult to distinguish when seen on with the land eastward of them. Vessels passing through Concepcion Channel should not approach this coast within a distance of at least 2 miles.

**Eardley Bay** is a deep inlet, at 1¼ miles north of Chance Islands. Rocky Islet, 3 feet high, with a clear passage northwest of it, lies in the entrance. At the head of the bay depths of 23 fathoms, rock, were obtained, but in an exposed and confined situation. There is a creek at the northern part of Eardley Bay, but a rock bars the passage to all but very small craft.

**Childers Bluff** is easily made out from either direction, showing out as a bold headland. The summit has two steps and is thickly wooded. At the base of Cape Childers lie two wooded islands (Charles Islands), 90 feet high, which appear from the southward as one island. From the northward they look like a wooded bluff with a rounded top.

**Hugh Bay,** 2½ miles north of Cape Childers, has good anchorage in 20 to 26 fathoms water, bottom of mud. It is well sheltered from all but northwesterly winds, and even with this wind no sea sets in.

The entrance is obstructed by a group of rocks and islets, dividing it into two passages. It can be entered on either side of these rocks and islets, but the northern entrance is the better. Outlying rocky patches, marked by kelp, must be guarded against by keeping close to the north shore if using the northern passage or the south shore aboard if the southern passage is used.

**Directions.**—Stand midway between the south Culling Island and Gull Rock, and from thence to the eastward of Middle Island. The wind being generally astern, a vessel will have room to roundup into the anchorage. As there are no good leading marks, it is best to judge the distance by the eye. When using the southern passage keep Stud Island close aboard. Bone Island (a low rock), touching the south side of Ruff Rock, bearing 134°, clears the sunken danger 269° from Gull Rock. The *Alert* anchored in 21 fathoms water, bottom of sand, with Wigwam Point bearing 348°, during fresh winds from the northwest to southwest, but suffered no inconvenience from wind or sea.

**Cape San Andres,** the west extreme of Canning Island, is 5 miles north of Hugh Bay. The cape is a low promontory, with a flat-topped range 1,000 feet high, 1½ miles to the eastward of it. It forms the northern entrance to Andrew Sound, which has not been examined. The cape may be passed in safety at a distance of ½ mile.

**Moraine Islands,** 1¾ miles north of Cape San Andres, are two wooded islands, the southern and larger being 150 feet high, and the northern one 52 feet. At ¼ mile northward and eastward from the northern island is a bare rock, 4 feet high, with foul ground between. Vessels should not pass southward of these islands. Two large kelp patches extend some distance into the channel.

**George Island,** the next large island north of Canning, is distinguishable from the southward by the tall, rounded summit, 2,003 feet high, near its eastern end.

**Portland Bay,** between Portland Island, 104 feet high, and the southwest extreme of George Island, affords a good and convenient anchorage for vessels of moderate size.

**Directions.**—It may be entered from either the southeast or northwest, but the former is preferable, as a current generally sets to the southeastward through the bay. Approaching it from the southward a small islet, Tall Tree Islet, with a group of tall, straight trees on its summit, will be seen. Keep this islet bearing 44° until Green Point bears 328°, then change course to 359°, passing between Entry Rock, 6 feet high, and Green Point into the anchorage. Care must be taken when avoiding the shoal off Green Point that the current does not take the port bow and set the vessel over to Entry Rock. In entering from the northwest when the passage is open, Tall Tree

Islet will be seen through, bearing 128°; then steer in midway between Portland and George Islands in not less than 6 fathoms.

**Anchorage.**—A good berth for a vessel to lie at single anchor is in 7 to 11 fathoms, stiff, blue clay, with Green Point bearing 212° and Entry Rock 134°, but if going to remain a vessel should moor in a berth 200 yards farther to the westward. A group of small islands and rocks lie 1 mile to the eastward of this bay, fronting a deep bay in George Island, at the head of which a vessel may moor in 18 fathoms water, bottom of rock; but being foul and uneven, this place is not recommended.

**Tides.**—High water, full and change, in Portland Bay is at noon; springs rise 4 feet. At ¼ mile west of Portland Island the current always runs to the southward.

**Cape Clanricarde,** 1 mile north of George Island, has a small islet off it; from this point northward to Lecky Inlet the shore is steep-to, with no anchorage in the small indentations of the coast line.

**Lecky Inlet** (in Wide Channel) is marked by a high cone over Squire Point, the north entrance point of the inlet. When approaching from the northward this cone appears as a long hogback. No anchorage has been found on the shores of the inlet.

**Athur Islands** lie off the south entrance point of Lecky Inlet; between them and the shore is a deep passage without anchorage.

### WESTERN SHORE.

**Port Bermejo,** at the southeast extreme of Madre Island, is a small anchorage among the islands north of Cape Cortes; it may be recognized by a bright sandy beach, which has a pool of fresh water inshore of it. The *Alert* found this anchorage useful in a heavy gale from the northwest, but it is only fit for moderate-sized vessels; it affords but indifferent protection.

A rock with only 6 feet of water over it, and not marked by kelp, lies in the fairway of the southern passage. Vessels, therefore, should not attempt to enter south of Shelter Island. On closing the coast three small wooded islands will be seen. Steer for Rat Island, 269°, and pass midchannel between it and Cat Island; then haul to the southward and anchor in 9 to 13 fathoms, bottom of sand, off the sand beach.

It is possible this may be the harbor mentioned in Sarmiento's narrative.

**Monteith Sound,** at the head of Landslip Sound, has good anchorage. To enter, vessels should pass 400 yards south of Snout Point, and steer north up Landslip Sound. A reef extends halfway across the sound from the eastern shore between two low islands. Keep the west island close aboard, and when past it steer for Turn

Point, the northeast point in Landslip Sound, gradually hauling into Monteith Sound, keeping the north shore aboard. Anita Rock and two kelp patches on the port hand just west of Turn Point show well.

**Anchorage.**—The anchorage is in 15 to 20 fathoms, mud, with Mount Sunday bearing north distant ¾ mile. From the anchorage a channel leads into Passage Inlet, but it is only fit for boats. Passage Inlet then joins West Channel.

**Caution.**—The passage at Turn Point leading north of Hocico de Caiman Island is foul, and should not be attempted.

**Hocico de Caiman Island,** probably named for its resemblance to an alligator's snout, is mountainous, the summit forming a cone, 1,191 feet high, sloping down to a low point at the entrance of Landslip Sound. When seen from the northward a small nipple shows about halfway down on the east face of the cone, which then slopes down to a low point. Numerous islands lie north of Hocico de Caiman, extending to Walker Bay. Between them is Snare Bay, a foul and useless bight. Vessels should not approach within 1 mile of this portion of the coast.

**Wake Island,** 40 feet high, forms the south entrance point of Walker Bay. Anchorage in 22 fathoms, mud, for small vessels may be found in Wilson Cove, 200 yards westward of Wake Island; it is, however, exposed to northerly winds, and can not be recommended, but might prove useful on occasion.

**Fox Point,** 1¼ miles north of Wake Island, is difficult to distinguish when approaching from the southward, but is readily recognized from the northward by Walker Step, a flat-topped hill, 437 feet high, with a steep fall on the eastern side near the summit, which then slopes down to the point.

**Mussel Rock,** which dries 3 feet at low water, lies ½ mile off Fox Point, and 400 yards northward from this rock there is a shoal patch marked by kelp with 3 feet water on it.

**Walker Bay,** between Wake Island and Fox Point, is deep, but anchorage fit only for very small vessels can be obtained on the north shore under a conspicuous cone, 1,884 feet high. The best anchorage is in the north part of the bight between Lapis and Parker Points, but the water deepens rapidly to 45 fathoms 400 yards off Parker Point. Fox and Lapis Points may be passed 200 yards distant in 13 fathoms. Mussel Rock and the patch northward of it are steep-to, and vessels can pass on either side, but the northern entrance will be found most convenient.

**Coast.**—The coast between Walker Bay and Molyneux Sound is clear with the exception of a rock, awash at high water, resembling a boat, 200 yards off Galeotilla Point.

**Molyneux Sound,** 4 miles north of Walker Bay, is broad and extensive. A branch named Grove Sound, leading to the southwest-

ward, probably joins West Channel, as it does not connect with Walker Bay. The sound is connected with Temple Inlet by a clear channel west of Drummond Hay Island. Off the north shore, nearly 1 mile from the entrance, is a convenient anchorage, one of the easiest of access in the channel. The serious objection to it is the heavy squalls which come down the extensive sound to the westward, striking a vessel with full force. The U. S. S. *Pinta* rode out a heavy gale with two anchors down, wind from the northwest, varying in force from 4 to 11.

**Dangers.**—A rocky patch with 8 feet water on it, about 200 yards in diameter, lies ¼ mile south from Michael Point (the northern point of entrance to Molyneux Sound), with a clear passage 150 yards wide between. Another patch lies ¼ mile east from Michael Point, having 12 feet water on it. Vessels on entering should keep to the southward of these patches, which are both marked by kelp, but do not show well.

**Buoy.**—On the southern edge of this rocky patch, south of Michael Point, a buoy is moored in 24 feet water. The buoy is cylindrical in shape and is painted red and surmounted by a staff and cone of the same color, with the name "Miguel" on it in white letters upon a black ground.

**Fawn Rock,** on which H. B. M. S. *Fawn* struck in 1870, lies 313°, distant 900 yards from Michael Point, and is steep-to.

**Buoy.**—On the southwest side of this rock a buoy, spherical in shape, painted black and white in horizontal bands, is moored in 12 fathoms water.

**Directions.**—Vessels on entering should keep to the southward of the shoal patches off Michael Point, which are marked with kelp, but do not show well. If the buoy is in place, pass well south of it. Approaching the sound the hill, 1,392 feet high, over Rogers Point, south of the entrance, must not be brought southward of 270° until Michael Point bears north, when head up the sound, keeping the south shore aboard; and when Romulo Island bears 353° steer for it on this bearing; when Fawn Rock is passed steer 10° for the anchorage. A small rock, with 18 feet water over it, lies 150 yards south of Romulo Island.

**Drummond Hay Island,** forming the north shore of Molyneux Sound, is high, rising to a cone 1,451 feet high in its south part. The east coast is clear with the exception of the shoals off Michael Point previously mentioned.

**Temple Inlet,** between Drummond Hay Island and Chaine Island, at ½ mile north of it, affords good anchorage in 15 fathoms, on a bottom composed of mud between rocks, on the north shore 2½ miles within the entrance; but a sharp turn to the northward, over a rocky ledge, between two islets, is against its general usefulness.

The eastern islet will be readily recognized by a single tree and a few bushes on it, differing in this respect from all adjacent islands. The chart is the best guide.

**Don Pedro Inlet,** north of Chaine Island, has an anchorage in 27 fathoms, muddy bottom, 1 mile from the entrance; it communicates by a boat passage with Temple Inlet.

**Tom Bay Anchorages,** 2 miles north of Don Pedro Inlet, include Tom Bay, Señoret Harbor, Tizard Anchorage, and Henderson Inlet. These anchorages are a short distance from the main channel, and the strong gales from seaward through Caffin Pass seldom reach them. They are therefore freer from strong winds than other ports near, and, having convenient anchorages for vessels of all sizes, are very valuable.

**Tom Bay.**—From the southward this bay is not easily distinguished from the numerous openings south of it. The navigator's best course in thick weather is to run the distance by patent log from Inocentes Island, and when nearing Tom Bay, David Islets, 50 feet high, showing as two round, wooded knobs, will be seen. In clear weather Mount Bromley, 1,110 feet high, marks the bay, appearing as a smooth, round-topped hill. Clements Hill, 670 feet high, about 1¼ miles north of the anchorage, is also a good mark, showing as a flat-topped hill, the western part being the highest. From the northward there is no difficulty in making out the bay. This anchorage has been much used by the steamers of the Kosmos Co. The usual anchorage, between Center Island and Station Patch, is very irregular and rocky. Station Patch, well marked by kelp, extends about 300 yards southeast from William Point. It has 3 fathoms over it.

**Señoret Harbor,** opening into the south part of Tom Bay, extends nearly 3 miles in a westerly direction, with an average width of 600 yards. The entrance is narrow, and in heavy weather appears to break right across. Center Rock, awash at high water, is at the end of the spit off Center Island, and narrows the entrance to 70 yards.

**Kingfisher Rock,** with 13 feet of water over it, lies about 2 miles within the entrance of Señoret Harbor, and a shoal extending northward for 150 yards from Viel Point contracts the channel between the rocks and point to 100 yards.

**Beacons.**—There are two temporary beacons on the north shore of Child Island, just west of Mather Island, and one on the main, about 300 yards farther west, to act as a leading mark for entering. Should the beacons be down, vessels should not attempt to enter without first marking the edge of the shoal off Center Rock.

**Directions.**—If the beacons are up, room must be taken outside to bring them in line bearing almost west, which will lead in midchannel between Mather Island and Center Rock. If the beacons are down, mark Center Rock and bring the north extreme of Child

Island to bear 272°, then steer a mid-channel course between Mather Island and Center Rock, in not less than 7 fathoms; when Center Rock is abeam, change course to 300° and anchor as convenient. From Nob Point to the head of the harbor the bottom is stiff mud; outside of Nob Point it is rocky. Perfectly sheltered anchorage in 11 to 17 fathoms will be found at the head of the harbor.

**Tizard Anchorage,** within the chain of islets, affords excellent shelter for small vessels in 11 fathoms, muddy bottom, secure from all winds. The entrance is between Parry Island on the south and Wingate Island on the north, from which Murray Patch extends 150 yards in a southeasterly direction. Care should be taken not to mistake the rocky pass between Parry Island and Stratford Island, just south of it, for the passage in.

The entrance is obstructed by a rock, with 16 feet water over it at low-water springs, lying mid-channel between Rat and Maine Islands.

**Directions.**—Having closed the port, steer for Wingate Island, bearing 291° till the east extreme of Stratford Island bears 196°, then close the north shore of Parry Island to avoid Murray Patch, which is well marked by kelp. Keep the kelp bordering the shores of Parry and Rat Islands tolerably close aboard, to avoid the 16-foot rock in mid-channel, which will give not less than 4 fathoms water. When abreast the west extreme of Maine Island steer for the anchorage.

**Anchorage** may be obtained in 16 fathoms, mud, with the south extreme of Wingate Island bearing 83°, and Datum Point, the west extreme of Stratford Island, 170°.

**Inner anchorage.**—If intending to proceed farther up, steer 296° between Single Tree and Unit Islands. Pass between Scot Island and a rock with a peculiar bush on its summit, off Bond Point, and anchor in 12 fathoms, mud, with Bond Point bearing 100° and Observatory Islet 176°. A reef extends northwest 200 yards from Observatory Islet. The *Alert* generally used this anchorage when surveying the locality, and rode securely during several strong gales.

**Henderson Inlet,** the northernmost of the Tom Bay Anchorages, has the easiest entry and is strongly recommended for vessels requiring to anchor in this vicinity.

**Directions.**—Close Mehegan Point, the northern entrance point of the inlet, which is steep-to, and bring the north point of Fletcher Island to bear 302°, and steer for it on that bearing, leaving all the islands to port. Burnt Forest Hill in line with Spero Rock 313° also leads in. Pass between Capato Point and Wingate Island, taking care to avoid Murray Patch, and to keep 100 yards north of Fletcher Island. Anchor in 15 fathoms, sand and rock, with the west point of Fletcher Island bearing 173° and White Cliff 100°.

**Caution.**—A shoal that uncovers at low water lies 750 yards 319° from the east point of Fletcher Island; vessels should not, therefore, have too much way on when passing this island.

**Tides.**—High water, full and change, in Tom Bay is at noon; springs rise 4 feet.

On Datum Point, the west extreme of Stratford Island, a lead plug, at the point of a large broad arrow mark, was let into the south side of a flat-topped granite rock facing Wigwam Point. The mean level of the sea is 5 feet 6 inches below the top of this lead plug. The rise of tide is much affected by the wind, a southwesterly wind apparently keeping the water in Concepcion Channel. In Señoret Harbor an undercurrent runs in opposition to the surface current to a depth of 5 fathoms. The surface currents in the inlets never exceed ½ knot an hour.

**Day Bay,** 2 miles north of Mehegan Point, has confined anchorage in 18 fathoms.

**Brazo Ancho,** the northeast point of Madre Islands, is low, but the land at the back rises abruptly to a height of 1,215 feet, forming a conspicuous object when seen either from the northward or southward.

### TRINIDAD CHANNEL.

**General remarks.**—The frequent tempestuous weather and heavy seas experienced off the western entrance to Magellan Strait render the entrance into the Pacific by that route at times difficult, even for vessels of great steam power. The weather and the sea in Trinidad Channel and its offing, 160 miles north of Magellan Strait, are generally more moderate, and hence it offers a favorble route for vessels proceeding into the Pacific Ocean when that by Magellan Strait can not be advantageously used. It is also an excellent channel by which to pass out to the Pacific from the Patagonian Channels when the delay occasioned by the English Narrows in Messier Channel will be avoided.

The channel is 38 miles long from the eastern entrance of Caffin Pass to Primero Point, the south extreme of Corso Peninsula; clear, with deep water, and high hills along the southern shore, while low land and clusters of islands mark the northern side.

As in the main strait, off Cape Pillar, the water at the western entrance of Trinidad Channel is shoal, from 17 to 40 fathoms; hence there is often a short rough sea even in fine weather. Inside, the water is deeper, and generally the swell does not come beyond Cape Candelaria.

Although the water in Trinidad Channel is deep, there is a ridge across the channel between Arragon Island (at the northwest end

of Madre Islands) and Corso Peninsula, on which the least water obtained was 17 fathoms, 8 miles westward of Seal Rocks, but the average depth is from 30 to 40 fathoms. This ridge was not extensively examined; it is, however, probable that no dangers exist beyond those charted, as even in the roughest weather, with a heavy swell, no breakers were observed. The water deepens on the western side to 40 fathoms.

The south shore is broken into several fiords, most of which are deep. There are two anchorages, Puerto del Morro and Port Henry. Port Rosario is a small and indifferent anchorage.

The north shore is low and wooded, but high hills rise at a distance of 1 or 2 miles inland. The more northern ranges are snow capped. The anchorages are Port Charrua and Kathleen Anchorage, in Brassey Pass, and Alert Harbor. On the south side the characteristics are rugged pinnacles and hills, gray from the large masses of limestone exposed. At first sight these appear snowcapped. Horn Peak is readily made out, but Rugged Head is not easily distinguished. Eastern Peaks are very conspicuous and appear as if they formed the southern entrance of the channel; they are crowned by three pinnacles. When closer the Organ Pipes can be distinguished; when north of Rugged Head it will be known by a pyramidal mass of rock off it and a peculiar projection on its side.

Though recommended as a safe channel to pass out to sea by, it should not be entered from the Pacific in the dark or in thick weather when the high land of Corso on one hand and Three Peaks and Eastern Peaks on the other can not be made out. The sea sometimes breaks 4 miles from the land, and in thick weather a vessel would be among the breakers before sighting the land. In fine weather, when the peaks are visible, there need be no hesitation in entering this channel.

The approach to this part of the coast is shallow, and the soundings will give but little clue to position.

Most dangers are marked by kelp, but, as already pointed out, this must not be depended upon, as the kelp is sometimes torn off by the heavy sea.

**Wind and weather.**—During the seven months, October to May, when the *Alert* was in this neighborhood, the wind was almost constant from north-northeast to west-northwest and accompanied by rain, the average fall being 11 hours out of the 24. The direction of the wind is, however, altered in the channels, and nearly always blows straight through them from the northward, thus a northwest wind in Trinidad Channel becomes a northerly wind in Concepcion Channel. Gales were frequent, sometimes violent, and always came with squalls and thick weather; breaks of fine weather occur sometimes, but they are rare and short.

The barometer is a useful guide, but its changes often accompany rather than foretell the changes of weather. A steady barometer, whether high or low, is a better indicator of fine weather than a high unsteady glass.

The mean barometer for the seven months was 29.79. Thunder and lightning are rare.

**Iris Island,** ½ mile southeast of Brazo Ancho Point, is a small grassy islet 20 feet high. The two small rocks southwest of it are steep-to and may be passed 200 yards distant on either hand. The passage between Iris and Cecil Islands is clear and can be used in safety.

**Topar Island,** dividing the eastern entrance of Trinidad Channel into Caffin and Brassey Passes, is 2,150 feet high and wooded about 800 feet up, the summit being a bare rocky table top. The shores are free from reefs and outlying dangers, but afford no anchorage. On the west side is Loveless Bay, deep and open to the prevailing westerly winds. Moreton Island, lying ½ mile off the southeastern shore, is about 40 feet high and wooded. Some rocks, well marked by kelp, lie ¼ mile north-northeast from the island, but are out of the track of navigation.

SOUTHERN SHORE.

**Caffin Pass,** leading from Concepcion to Trinidad Channel south of Topar Island, is 1½ miles wide, with 116 to 190 fathoms near the center.

**Gort Island,** 90 feet high, 400 yards north of Brazo Ancho Point, is steep-to and can be passed at 200 yards, but vessels should not pass between it and Brazo Ancho Point.

**Brazo Peninsula.**—From Brazo Ancho Point to Delgado Sound, 5 miles farther northwest, there is no anchorage. Vessels should pass to the northward of both Gunn Rock and Medio Island.

**Gunn Rock,** with 7 feet water over it, and irregular soundings of 20 to 100 fathoms within a short distance around, lies nearly ¾ mile 142° from the southeast extreme of Medio Island. It is the only known danger in Caffin Pass, and being well marked by thick kelp is easily avoided.

**Medio Island,** in the western part of Caffin Pass, is 150 feet high, ½ mile long northwest and southeast, and thickly wooded. On the south side of this island, within a short distance of its southeast extreme, lie two rocks, 3 feet high, with 70 fathoms close-to. The island may be passed at a distance of 400 yards on either side.

**Rice Rocks,** lying 1½ miles westward of Medio Island, are always above water. When the swell is heavy they look alarming, seeming to extend a long distance into the channel and breaking heavily, but

being in a line with islands and about ⅛ mile from the shore they are out of the direct track of vessels.

**Redbill Islands** are a group of low islands and rocks obstructing the entrance to Delgado Sound. The space between the islands is rocky, but the northern or channel side of them is free from offlying dangers and may be approached to within ½ mile.

**Webster Rock,** with 4 feet water over it, lies about ¾ mile northwestward of Redbill Islands. It lies in the fairway of Delgado Sound, and being but slightly marked with kelp it is difficult to make out. Cohen Rocks lie about midway between Webster Rock and Redbill Islands.

**Delgado Sound** is a very deep inlet. The Pan de Azucar, 880 feet high, is a remarkable sugar-loaf hill marking the entrance. The head of this sound, apparently the Puerto Delgado of Sarmiento, is unfit for vessels of the present day. At the extreme head is a log portage used by the Indians for hauling their canoes into Tom Bay.

**East Bay** is a narrow inlet, at the head of which, under Mount Vereker, is Stowaway Cove, a very snug place, where the *Alert* remained quiet during a week of very bad weather. The approach is very narrow, and the anchorage in 12 fathoms, soft mud, is confined; but if a hawser is made fast to the shore, to prevent swinging, no inconvenience will be felt.

**Ancon del Sudueste,** on the west side of Delgado Sound, is a deep, narrow fiord, ending in a succession of lakes. There is no anchorage fit for any but the smallest craft.

**Pilot Island,** the next large island west of Coppinger Peninsula, rises to a height of 1,608 feet, and is one of the most prominent objects in the channel. Cape Candelaria, 520 feet high, the northern extreme of the island, appears, when seen from either eastward or westward, as a conical hill, wooded at the base only.

**Division Islands.**—Between Dinwoodie Point, the northern extreme of Coppinger Peninsula, and Pilot Island is an opening 2 miles wide, having in it a group of islands (the highest 382 feet high), apparently forming two sounds. These islands are named the Division Islands, and terminate at Cook Point in a bluff which is steep-to, and can be passed at a distance of 200 yards.

**Fairway Patch,** lying midway between Cook Point and Carson Point, the east extreme of Pilot Island, has 20 feet water on it and from 7 to 10 fathoms close around. From the shoalest part of this patch the west extreme of Morgan Island is in line with the east extreme of Grant Island, bearing 221°. To pass between Cook Point and Fairway Patch (the route recommended), keep Gordon Hill, near the south end of Pilot Island, open west of Division Islands, 226°, till Cook Point bears 111°.

**Rock.**—A large patch of kelp, believed to be attached to a rock, is reported to exist in the entrance to Puerto del Morro, midway between Cook Point and Fairway Patch.

**Puerto del Morro,** formed by an indentation on the eastern shore of Pilot Island and Grant Island, is about 1 mile in extent northeast and southwest, 200 to 400 yards wide, having in it depths of 6 to 19 fathoms, bottom chiefly mud. The mountains on the western side of Puerto del Morro rise from the shore to a height of 1,608 feet. This port, the only safe anchorage upon the south shore for a large vessel between Tom Bay and Port Henry, although convenient in fine weather, is exposed to williwaws, which blow with extreme violence in bad weather. The most sheltered position is in 13 fathoms, sand and rock, with the west extreme of Grant Island bearing 162° and the northwest point of that island 58°. The northern channel between Grant Island and Birch Islands, though only 100 yards wide, is the best, and has not less than 5 fathoms; it will be seen open when bearing 257°.

**Tides.**—High water, full and change, in Puerto del Morro is at 11h. 45m.; springs rise 5 feet, and no stream is felt.

**Cockle Cove,** 3 miles south of Cape Candelaria, is unfit for vessels drawing more than 15 feet water or more than 170 feet long, but for vessels of that size it affords a snug retreat, free to a great extent from the williwaws experienced at Puerto del Morro. The cove is, however, a long way out of the main channel, and, as it is necessary to moor, is of little use as a stopping place for a single night.

**Directions.**—From midway between Cook Point and Fairway Patch steer 227°, 1 mile, then 198°, 1¼ miles. Avoid the reef that extends from Henby Island to the southward and eastward. The entry is between two wooded islets 40 feet high. Steer in between these islands, named North and South Gate, and pass mid-channel between Center Island and the north shore. The channel has a depth of 5 fathoms, but is narrow, and requires careful navigation. Moor in 6 fathoms, soft mud, with Observatory Islet shut out by Center Island, 83°; 36 fathoms on the starboard anchor to the northwest and 25 fathoms on the port anchor to the southeast will be found quite sufficient. At ½ mile south of the anchorage is a boat passage leading into Lamero Sound. With the exception of these two ports there is no fit anchorage around the Division Islands.

**Supplies.**—Excellent fish may be netted in the cove at the mouth of a small fresh-water stream a short distance west of the Gate Islands.

**Tides.**—High water, full and change, in Cockle Cove is at 11h. 45m.; springs rise 5 feet, and no stream is felt.

**Anton Bay,** on the north coast of Pilot Island, is 1½ miles from Cape Candelaria. Eastward of the islands forming the bay the

ground is foul, and has uncharted rocks lying among depths of from 11 to 14 fathoms.

**Hernando Islands,** in the entrance of Lamero Sound, are a group of islands and rocks. The largest, 540 feet high, has a remarkable square cleft in the summit and slopes down to a low, projecting point on the north shore, which is free from outlying dangers. There is no anchorage among these islands.

**Lamero Sound** extends to the southeastward for 7 miles, and then appears to end in a chain of lakes, only to be entered by boats of light draft. On the west side, near the northwest entrance, are two conspicuous peaks—Silvertop Mountain, 1,478, and Mount Graham, 1,677 feet high. The former being of white, shining limestone, is very prominent. Mount Graham has a black summit.

**Port Rosario,** 2 miles west of Lamero Sound, affords but a very indifferent anchorage; it is about ½ mile in extent, with general depths of 19 to 25 fathoms. The port will be recognized by two islands, respectively 300 and 500 feet high, and wooded to their summits, which lie to the northwestward of the anchorage. Off the northern island is a small bare rock 10 feet high, against which the swell breaks furiously. The entrance, 300 yards wide, is between Baker Islet and Peach Rock, 4 feet high, black and jagged, with a patch of kelp in 12 feet water, 400 yards within.

**Directions.**—Close the port when Peach Rock bears 184°, and steer in 190° between the rock and Baker Islands; when midway between them alter course to 173° for ¼ mile to avoid the shoal patch of 2 fathoms, then 283° for the mound over Short Point.

**Anchorage.**—It is the best to moor in 18 fathoms, sand and mud, with Short Point bearing 299°, and the east extreme of Baker Islands 44°. The space here is confined, but it is to be preferred to the rocky bottom farther out, and shelter is obtained from the furious squalls which sweep over the gap at Burrage Pass.

**Cave Bay,** the bight south of Byatt Island, has not been examined. From its situation it would be exposed to the full strength of the westerly winds, and is therefore quite unfit for anchorage. It is connected with Port Rosario by a narrow passage named Burrage Pass.

**Wolsey Sound,** 4 miles west of Port Rosario, is a deep fiord 3 miles long in a southerly direction and about ½ mile wide. East of Wolsey Sound, distant 1½ miles, is the entrance to Cranmer Sound. These sounds are connected on the south side of Latimer Island by a channel having in it numerous islets and rocks, among which indifferent anchorages can be obtained. There is no ship passage into Cranmer from Wolsey Sound, nor anchorage within the former if entered from the northward.

**Directions.**—Enter Wolsey Sound midway between Fisher Island and Cape Cardinal. A rocky islet lies southeast 1 mile from the entrance, in the middle of the passage joining the two sounds; pass between this islet and the southwest point of Latimer Island, off which a shelf extends 100 yards, and anchor close under the south shore of Latimer Island in 9 to 17 fathoms, rocky bottom.

**The coast** from Wolsey Sound trends in a westerly direction for 2 miles to the Seymour Islands at the east side of entrance to Port Henry. The whole of this distance is fronted by numerous rocks and breakers extending nearly ¼ mile offshore.

**Eastern Peaks,** the northern one of which is Three Peaks, 2,310 feet high, rise abruptly from the coast and are wooded nearly to the summit, which is of dark bare rock with three distant peaks, the northern peak being lower than the other two. These peaks are clearly distinguishable from Cape Candelaria, also from seaward, and being conspicuous they are an excellent mark to the navigator.

**Port Henry** is a valuable but somewhat confined anchorage, fit for vessels wishing to anchor for a night when the weather is fine; when stormy the williwaws are severe and a heavy swell sets into the bay.

The port extends in a southerly direction ½ mile and is 600 yards wide. About ½ mile within the entrance a point projects from the western shore half the distance across the port; southward of this point a channel leads north of Jane Island into Aid Basin.

The entrance is easily made out from both the eastward and the westward: from the former, Seymour Islands, a group of low wooded islets and rocks, and Arragon Island, a round grassy mound 120 feet high, are sufficient guides; from the latter, it may be known by its being the first opening east of Rugged Head. The white sand between Maple and Parr Points is also conspicuous. It is the first sand beach on the south shore after entering the channel, having a low sandy cliff at the back, and a round, rocky, and wooded mount at its western end. When off the port the sharply serrated ridge of the Organ Pipes, 2,329 feet high, is a good guide.

**Ann Breaker,** off the entrance to Port Henry, is a most dangerous rock, unmarked by kelp, and in ordinary weather seldom breaks. A rock, with 5 fathoms water over it, lies 200 yards north of Ann Breaker. Rugged Head, seen open westward of Arragon Island, bearing 224°, will keep a vessel to the northward of these dangers.

**Sentry Islet** is a bare rock, 10 feet high, and is the northern islet upon the west side of entrance. Its eastern side is steep-to, but foul ground extends 400 yards to the northward and westward.

**Low Island,** situated 700 yards southeast of Sentry Islet, is 30 feet high. A dangerous rock lies 18°, about 200 yards from it, and

another 150°, distant 50 yards. A short distance eastward of this rock there is a depth of 4 fathoms.

**Kelly Rock,** 700 yards northeast of Low Island, has 7 feet water on it, and 7 to 9 fathoms close around, and with a patch of coral, having 4 fathoms water on it, lying 358°, 200 yards from the rock, form the outer dangers in Howard Bay on the eastern side of the entrance. Foul ground extends over the whole space inshore of them.

**Anchorage.**—The best berth is in 7 to 14 fathoms, sand, fair holding ground, with Low Island bearing 7°; Maple Point, 60°; and Observation Rock, 311°.

**Directions.**—When off Port Henry, with the Organ Pipes bearing 196°, Harbor Peak, a cone 1,640 feet high, connected at half its elevation with a loftier range, will be seen; also the sand beach before mentioned. Keep Rugged Head open west of Arragon Island, bearing 226°, until Harbor Peak is in line with the east extreme of the sand beach, 160°, which leads in mid-channel till Low Island bears 270°, when a 213° course will lead into the anchorage.

**Aid Basin,** the continuation of Port Henry to the southward, is a completely landlocked harbor, with anchorage in 15 to 24 fathoms, soft mud, but the entrance between Jane Island and Bluff Point Peninsula is only 60 yards wide; a ledge with 4 fathoms over it extends across, and on the northern side lie two sunken rocks nearly 200 yards apart, the eastern rock about 65 yards and the western rock within a few yards of the shore. None but a small vessel could use this channel and nothing is to be gained by entering Aid Basin, as it is impossible to judge of the weather outside, and from the formation of the land it is often raining heavily in the basin when it is clear and fine at Port Henry.

**Supplies.**—There is a lake of excellent fresh water at the head of Aid Basin, and wood is in abundance.

**Tides.**—It is high water, full and change, in Port Henry at noon; springs rise 5 feet, and the stream is not felt.

**Coast.**—From Arragon Island the coast trends 2½ miles southwest to Rugged Head, thence southward 4½ miles to Cape Hawksworth, the whole coast between them being fronted by low islets and rocks, some of which lie as much as 5 miles offshore. During the *Alert's* stay in this vicinity landing on any of the islands was found to be impracticable, owing to the heavy westerly swell. Numerous breakers were observed extending about 3 miles westward of Arragon Island, but probably some remain yet uncharted. Mariners, therefore, should not approach within 5 or 6 miles of this coast.

**Rugged Head,** a detached mass of rock of a pyramidal form lying at the base of the Tudor Range, is not easily made out from

the westward, but from north or south it appears as a round-topped island, and may be further recognized by a peculiar mass of rock, resembling a shoe, on the slope of Tudor Range. (See view on chart No. 447.)

**Horn Peak,** over Cape Hawksworth, resembling a horn, is very conspicuous when viewed from the northwest.

**Coast.**—South of Cape Hawksworth a deep sound extends to the eastward, on the south shore of which is April Peak. Thence southward the land has a different appearance from the shores of Trinidad Channel, being nearly clear of vegetation, and of a light gray color. This is remarkable from seaward, and is a good guide when closing the land from the westward.

NORTHERN SHORE.

**Brassey Pass,** north of Topar Island, connects Wide and Trinidad Channels, and is wide and free from danger. Between Cape Somerset, the southeastern cape of Wellington Island, and Camel Island, 3½ miles farther west, are three inlets, named, respectively, Hastings and Wilshere Fiords and Port Charrua, the two former having no anchorage in them.

**Tides.**—High water, full and change, in Brassey Pass is about noon. At spring tides the streams run through the pass 1½ knots per hour, flood to the eastward and ebb to the westward.

**Coast.**—From Cape Somerset to Cordova Point, at 9 miles west of it, the coast is broken by deep fiords between rugged and snow-capped ranges about 3,000 feet high; the most prominent is Double Peak, or Notre Dame Mountain, formed by two snow-capped peaks 3,433 and 3,610 feet high, connected some distance below their summits by a flat ridge. Camel Island is very conspicuous from the westward, showing as a solitary square lump with two mounds upon the summit; the southern face is a precipice about 800 feet high. Mount Bethune, 1,339 feet high, on the north shore of Kathleen Anchorage, is very similar; that port forms a deep gap between them which shows very distinctly from the westward. Cape Somerset and Mount Ellen falling abruptly into the sea form prominent capes, and are both steep-to.

**Port Charrua,** 2¾ miles west of Cape Somerset, affords a convenient and sheltered anchorage, in 7 fathoms, mud, ¾ mile within the entrance. The arm extends north for 1½ miles, and has at its head a large waterfall 434 feet high, near which grow some large trees which might serve for spars. The west shore of the port is formed by lofty and precipitous mountains, over which the squalls pass without reaching the anchorage.

**Directions.**—At the entrance there are 26 fathoms water, deepening inside to 40 fathoms, again shoaling to 26 fathoms when Celery

Islet is abeam. Vessel should proceed slowly, as the next cast will be 7 fathoms. Anchor with the east side of the cliff in line with Brown Point bearing 10°, Celery Islet 117°, and the small beach on the west shore 251°. Two rocks, dry at low water, extend from Celery Islet 100 yards into the anchorage, with 6 fathoms close off them.

**Kathleen Anchorage** is 5¼ miles from Cape Somerset and is easily recognized by Camel Island, 1,380 feet high, which forms the southern shore. From abreast Emma Point, the east extreme of Camel Island, the inlet extends in a westerly direction with deep water, till Mabel Islet on the south shore is abeam, when 29 fathoms will be obtained, shoaling to 15 fathoms at 200 yards farther in abreast an opening into Trinidad Channel, through which Sentry Islet will be seen. Vessels should not proceed above Skua Islet. The best berth is with Skua Islet bearing 286°, and the east point of Seaward Entry 212°, in 15 fathoms, clay. The bottom is composed of rocks, with stiff, blue clay in the spaces between. The squalls are severe, but the water is always smooth. In the middle of the anchorage ground is a rock of small extent, on which 5 fathoms least water was obtained. From the anchorage, the state of the weather and sea in Trinidad Channel can be conveniently noted.

On the west shore, 2½ miles from the anchorage, are a few acres of good, straight trees, with but little or no undergrowth, most of which would make a topmast, and could be got into the water with little trouble. On the east shore, 1½ miles from the berth, good large wood, fit for steaming purposes, may be had.

**Seaward Entry** is narrow and filled with kelp, having a rocky ledge with 2¼ fathoms of water extending across. The sharp turn at Sentry Islet and the rush of tide through the pass forbid its use even by small craft.

**Windward Bay,** on the southwest side of Camel Island, is a poor place with a rocky bottom and a bad holding ground.

**Burges Island,** at 1 mile west of Camel Island, is about 25 feet high, thickly wooded, and has no ship channel north of it. A rock, always above water, lies ¼ mile south of the island.

**Petley Islands,** 80 feet high and wooded, lie nearly 1 mile south of Cordova Point. Their south shores are steep-to, and may be passed at ¼ mile distant. A cluster of bare, low rocks lies ½ mile north by west of the western island, and another cluster to the eastward.

**Brazo del Norte,** at 7½ miles north-northwest of Petley Islands, is about 3 miles wide at its junction with Trinidid Channel; thence it trends in a northerly direction for 33 miles, where it terminates in several deep fiords of no use for navigation. These fiords have in some instances an indifferent anchorage at the head.

The eastern shore is formed by lofty mountains with deep inlets between them. The western shore is lower, and has numerous indentations and inlets. Cathedral Mountain on the east shore, a conspicuous peak, 3,836 feet high, resembling at a distance the spire and roof of a church, is usually hidden by clouds, but when clear is visible from the Gulf of Trinidad.

**Malaspina Islands** are an extensive group of islands and rocks situated at the western entrance of Brazo del Norte. The south shores are free from danger, and may be closed to within a distance of ½ mile. North of Meidel Islands is a boat passage, with a small bight at its eastern entrance, in which there is anchorage for small vessels in 10 fathoms, bottom of sand and shell. This berth is sheltered from the northward and westward.

**Neesham Inlet,** 2½ miles northwest of Malaspina Islands, is very small, and the bottom is too rocky to be of use as an anchorage. The entrance to the inlet is marked by Schweers Island, lying south of it. The inlet extends 3½ miles northward, ending in a small creek. On the west shore are several passages into Picton Channel, but all are unfitted for navigation.

**Van Islands,** 3 miles west of Malaspina Islands, form two distinct groups, occupying a space of 3 miles east and west. The east group is the higher of the two. Peak Island, 60 feet high, having a pointed summit, is the most conspicuous of the whole group. Coming from the eastward it is the first Van Island seen, and is visible about 12 miles. Between the two groups are several rocky islets and sunken dangers. The western group is low and wooded, and free from danger on the north and south shores, but Double Rock, 10 feet high, and several other rocks over which the sea breaks heavily extend ¾ mile westward from the western island. Mount Nares, the highest land over Alert Harbor, bearing 356°, leads west of these dangers in about 96 fathoms.

**Rameses Islands,** at the south point of Mornington Island, are low, with several small peaks about 150 feet high.

**Danger.**—The channel between Rameses and Van Islands has much foul ground; extreme caution is therefore necessary if this passage is used, and the navigator is recommended to keep the north shore of Van Islands not more than ¾ mile distant.

**Coast.**—From Rameses Islands the coast trends in a northwesterly direction 2½ miles to Alert Harbor, with foul ground in the bight between. In clear weather the summit of Pilot Island (on the south shore), in line with the east extreme of the west Van group, bearing 145°, will lead westward of all dangers.

**Alert Harbor** is easy of access, with good anchorage and shelter. Being so close to the entrance of Trinidad Channel, it is especially

valuable to a vessel in distress, and it is at all times to be preferred to Port Henry.

It is easily distinguished by Castle Point, a steep white limestone cliff, 150 feet high, wooded on the summit, and Knocker and Button Islets in the middle of the entrance, the latter showing as a round, wooded knob. The Cone, 416 feet high, near the head on the eastern shore of the harbor, is wooded and has a clear grassy patch on its eastern slope; the latter is the best mark. Fairway Rock, 30 feet high, is bare and rugged, and shows well at a distance of 5 miles. Innes Point is a cliffy bluff.

**Directions.**—Approaching this harbor, Castle Point, bearing 10°, leads eastward of the Challenger Breakers up to the entrance between Fairway Rock and the rock awash west of Black Rock. To avoid this danger close Fairway Rock, taking care not to open the Cone eastward of Knocker Island until Fairway Rock bears 246°, thence steer 348° for Fielden Point to avoid a sunken danger which lies 134° from Button Island. When Innes Point is passed the harbor is clear. There is no passage between Castle Point and Spider Island, just south of it, nor between Fairway Rock and Aldrich Islands, near the west entrance point.

**Anchorage.**—There is good anchorage in 12 to 23 fathoms, mud, between Knocker Island and Currant Point, nearly 2 miles north of it, the holding ground improving toward the north shore. A good berth for a large vessel is with Fairway Rock, seen between Knocker and Button Islands, bearing 162°, and the islet north of Fielden Point, 89°.

**Mackerel Anchorage,** at the head of Alert Harbor, is a secure retreat for small vessels, being perfectly landlocked, with good holding round. The chart will be the best guide to this anchorage.

Large quantities of mackerel and mullet were netted at the entrance of the fresh-water stream at the head of the inner harbor by the *Alert's* crew. They also were very successful with the seine on the sandy beach southwest of May Islands.

**Directions.**—When off Innes Point the entrance to the channel bearing to the inner anchorage bears 331°, distant 2 miles, and Salient Point, on the west shore, will be distinguished. Mid Rock, 12 feet high, near the middle of the narrows, between the outer harbor and Mackerel Anchorage, with foul ground extending the whole distance to the east shore, will be seen when off Salient Point. Pass 70 yards west of Mid Rock, 150 yards off Caution Point and 100 yards off Turn Point, thence northward to the anchorage in 15 fathoms, mud.

**Tides.**—High water, full and change, in Alert Harbor is at 15m.; springs rise 7 feet; no stream is felt.

**Coast.**—The coast from Alert Harbor to Cape Gamboa, 4 miles westward, is much broken, and rocks under water extend in some

places for 1 mile offshore. Step Hill, 150 feet high, is shaped like a quoin; the southwest side, being steep and of a light gray color, shows well to seaward. A long, sandy beach lies just west of this hill, and is the only prominent one in the neighborhood.

**Seal Rocks,** 5 feet high and about 6 miles 276° from Van Islands, are a dangerous cluster of rocks ½ mile in extent. Three heads show above water and always break; in ordinary weather the breakers can be seen from the deck at a distance of 8 miles. There are two sunken dangers, on which the sea usually breaks, lying to the eastward of Seal Rocks, the eastern one being a mile distant from them. Vessels can pass either side of Seal Rocks, but the southern passage is recommended.

**Bossi Bight,** between Cape Gamboa and Primero Point, 13 miles farther west, is apparently shallow and full of rocks and small, bare islets through which no passage could be discovered. In southwesterly gales the breakers extend the whole distance across from Cape Gamboa to Primero Point. In the northeastern part of the bight is an inlet, apparently leading toward Payne Bay in Picton Channel. On the shores of the bight are several peculiar hills, like huge towers, thickly wooded.

**Corso Peninsula** forms the west shore of Bossi Bight and the north entrance point into Trinidad Channel. It is connected with Mornington Island by a low isthmus intersected with lagoons, and with no apparent passage even for a boat into Spartan Bight.

**Mount Corso,** about 5 miles north of Primero Point, has a smooth, rounded summit, 1,420 feet high, connected by a wooded range with several other hills, all conical in form. On the south side it slopes gradually down to a plain, terminating in Primero Point, a long, low, shelving point, off which numerous islets and rocks extend 1¼ miles and breakers 2½ miles south. This vicinity is exceedingly dangerous and should be studiously avoided. The west side of Corso Peninsula is fronted by a long beach having numerous islets off it and outlying sunken rocks. The lead gives no warning of these dangers, which rise almost perpendicularly from a depth of 30 to 40 fathoms. They are unmarked by kelp and, unless the swell be heavy, do not indicate their position by breakers. Mariners must therefore be very careful when approaching this dangerous portion of the coast.

**Cape Pakenham,** the western extreme of Mornington Island, 9½ miles north of Primero Point, is a low, rocky point off which lies a cluster of rocky islets. The summit of the cape, Spartan Cone, is very conspicuous from seaward. Breakers were observed at about 5 miles westward of Cape Pakenham.

As this portion of the coast has not been closely examined, strangers should be on their guard when approaching the channel from the westward. Being, however, as correctly defined as the approaches to Magellan Strait and Messier Channel, mariners bound to the southward and arriving off the Gulf of Trinidad in fine weather should not hesitate to take advantage of the favorable opportunity to enter the channel and continue their passage in smooth water.

### DIRECTIONS FOR TRINIDAD CHANNEL.

**Outward bound.**—Vessels from the southward should steer over for the Madre Islands, passing north of Inocentes Island. In thick weather, though the hilltops are obscured, the lower land can often be made out. The separation of two cascades, resembling a hayfork, about ½ mile south of Rogers Point, is a good mark to steer for. The slope of the high hill over Rogers Point also shows well through the rain.

Trinidad Channel, being wide and clear, can be navigated at night if required. Having passed ¼ mile eastward of Iris Island, steer 359° for 1¼ miles for the entrance of Caffin Pass. Steer thence 307°; when 12½ miles are run Cape Candelaria will bear 178°, distant 1¼ miles. From this position a run of 13 miles on a course 280° will place the vessel between Seal Rocks and Port Henry: thence the course is 274° to sea. Three Peaks, 2,310 feet high, 2 miles east of Port Henry, kept northward of 111°, will lead south of the dangers off Primero Point, northwest of Port Henry. It is advisable to make a good offing at once. As the west coast of Mornington and Campaña Islands have sunken dangers a long way offshore, the navigator must not be in a hurry to haul to the northward.

**Entering from seaward.**—The land should not be closed nearer than the meridian of 76° W. until latitude 49° 58′ S. is reached, when the channel may be approached on that parallel until either Horn or Eastern Peaks are made out. The triple summit of Eastern Peaks, of a black color, is the most prominent object when closing with the channel. Mount Nares, 2,447 feet high, when seen from the westward of Corso Peninsula, bearing 100°, appears as a flat-topped, conical mountain. From the same position Cape Gamboa shows as a long ridge falling steeply into the sea, consequent on the lowland at the base of the mountains not being visible from that distance. If the weather is clear, the range of snowy mountains on the east shore of Brazo del Norte will be seen, conspicuous among them Cathedral Mountain. Three Peaks bearing 111° will lead into the entrance of the channel in 40 fathoms, sand.

When Mount Corso bears 10°, steer 98° for 11 miles, passing between Seal Rocks and Port Henry. The water will shoal to 24 fathoms, when Rugged Head bears 156°; it then gradually deepens to 50 fathoms, when Seal Rocks bear 353°, after which the channel is deep and clear. From abreast Seal Rocks steer a 103° course for 12½ miles, when Cape Candelaria will bear 178°, distant 1½ miles; thence steer 127° between Medio Island and Brazo Peninsula, passing eastward of Iris Island at ¼ mile distant; thence a course may be steered through Concepcion Channel.

Inocentes Island appears from the east entrance of Trinidad Channel as a flat-topped mound with low land on either side of it. Both shores of Concepcion Channel are mountainous, the most remarkable being Singular Peak, on Chatham Island, a peculiar mass of rock on the summit of a mountain 3,060 feet high. Childers Bluff is also readily recognized.

**Tides.**—High water, full and change, in Trinidad Channel is about noon; springs rise about 6 feet. The flood stream runs to the eastward and the ebb to the westward. The turn of the stream depends on the recent winds; southwesterly winds hold the flood up in both Trinidad and Concepcion Channels. The stream runs about ½ knot per hour, except in Caffin and Brassey Passes, where it runs 1½ knots at spring tides. Off Cape Somerset there are tide ripples.

**Supplies.**—Like all other parts of the Patagonian Channels, wood and water are everywhere abundant. Timber for spars can be obtained in Port Charrua and Norte Dame Fiord. Fish were netted in large quantities at most of the ports described. The method adopted with success in the *Alert* was placing a trammel net across the entrance of the small coves into which ran a fresh-water stream at high water, at which time the fish are close to the beach feeding; then driving the fish into the net. During the months of October and November great numbers of brant geese frequent the grassy shores of the ports, and are fair eating. Wild celery can be obtained in most parts, and forms an agreeable addition to the table when cooked like spinich. It was found around most of the deserted wigwams in great profusion.

The natives are to be met with on the outer coasts in great numbers during the sealing season in December and January. Although they are harmless and inoffensive while in the vicinity of a vessel or armed boats, they are not to be trusted.

### WIDE CHANNEL.

Wide Channel (Brazo Ancho of Sarmiento) commences at Brazo Ancho Point, the northeast point of the Madre Islands, where Trinidad and Concepcion Channels meet Wide Channel, and extends 38

miles to the northward, from Topar to Saumarez Island, with a breadth varying from 1¾ to 3½ miles.

The navigation of Wide Channel is often impeded by drift ice from Eyre Sound; numerous large pieces of ice have been seen in this channel in June.

**Gage Inlet,** about 12 miles up from Cape Somerset, extends 2 miles northwestward; it is narrow and deep, with shores rising to precipitous mountains. At 1 mile within the entrance is Medio Islet, south of which the passage is full of sunken rocks. At 400 yards above the islet the inlet is only 65 yards wide, and there the tide runs strongly; when through the narrows, there is a small bay on the north shore, having confined anchorage and not room to swing. There is a similar anchorage at the head of the inlet. Taking into consideration the intricate navigation, Gage Inlet should be avoided.

**Refuge Cove,** about 1¾ miles northward of Gage Inlet, is adapted for small vessels only, having anchorage in the center of the cove in 6 to 7 fathoms.

**Sandy Cove,** at the south entrance point of Antrim Inlet, 6½ miles north of Refuge Cove, is not recommended, the bottom being rocky and irregular, and the anchorage too close to the shore. In the northern part of the cove is a rock marked by kelp, and another in the southern part that uncovers at low water.

There is anchorage in 14 fathoms in the center of the cove, but the anchor is liable to drag into deep water.

**Antrim Inlet** extends nearly 4 miles northwest and terminates in two large basins, connected by boat passages, in which are whirlpools.

Elena Cove is a sheltered anchorage at the head of Antrim Inlet, the channel being deep.

A rocky ledge extends from the east shore of the cove to the middle of it, and vessels should not pass south of the ledge, but anchor between the entrance points of the cove in 14 fathoms.

**Ringdove Inlet,** on the east side of Wide Channel, abreast Antrim Inlet, is 1½ miles wide between the entrance points; the outer part of the inlet extends northeast 4½ miles to Herminia Island; on either side of this island there is a deep channel, 200 yards wide, leading to the inner part, which extends about 5 miles farther inland.

Good anchorage will be obtained in Richmond Cove or Chacabuco Bay, formed by Jones Islands and the eastern side of the peninsula terminating in Hyacinth Point, the south entrance point to the inlet.

**Beacon.**—A post bearing a signboard with the inscription "Francisco Jose" has been erected on the northern end of Francisco Jose Island in Chacabuco Bay.

**Wood and water.**—Water can be obtained on the east side of Ringdove Inlet from the cascades of Mount O'Higgins, at the foot of

which landing may be effected. Wood can be obtained from Rosa Island.

**Tides.**—High water, full and change, in Chacabuco Bay is at 40m.; springs rise 5¼ feet.

**Saumarez Island.**—Wide Channel, divided by Saumarez Island, communicates with Eyre Sound to the northeastward. There is a passage on either side of Saumarez Island, but Grappler Reach, the eastern, is the wider of the two, passing close to Bold Head, an immense dark mass of rock rising abruptly from the sea to the height of 1,000 feet; abreast of this head is the entrance to Eyre Sound, which is 35 miles long.

**Chasm Reach,** the passage west of Saumarez Island, though narrow, is perfectly clear and deep. The southern entrance may be known by two remarkable white patches on the face of the rock on Patch Point on the western side, and a third patch a little farther to the northward, which can be seen as soon as Dutton Island is passed. The distance by this passage is 2 miles shorter than by the other way, and in the autumn, when the ice comes down, its navigation is safer than the eastern passage; even going to Port Grappler it would be almost as short, but except for avoiding ice it has no advantage. The current in this reach is not very strong.

**Veto Inlet** appears to have a good entrance and probably fair anchorage.

**Shoals.**—The *Amethyst* struck on a shoal that was found to extend from 200 to 800 yards from the north point of Saumarez Island. The shoal has two rocky heads with 12 feet least water. The kelp in this neighborhood was visible only a short distance.

There is a depth of 14 fathoms between the eastern rocky head and Saumarez Island.

A small kelp patch was observed from the *Gannet* in a cove in Angle Island, just within the new entrance to Chasm Reach, about 60 yards from the shore.

**Corn Rock.**—This rock, 33 yards long north and south and 11 yards wide, has 11 feet over its center and 8 to 71 fathoms around it. From it the peak of Center Island bears 60°, and the tangent to Curle Point, Angle Island, 150°.

**Buoy.**—A wooden float with a staff 13 feet high carrying a cylindrical topmark, all painted black, has been moored to mark Corn Rock.

**Tides.**—The flood tide in the vicinity was observed to set northeast and the ebb south, toward the shoals.

**Port Micaela,** on the northeastern shore of Saumarez Island, may be recognized by the white sand beach on the opposite shore bearing 88°.

There is a sunken rock in the south part of the port, and the bottom is irregular. There is anchorage in the center in 17 to 20 fathoms, but Port Grappler is far preferable.

**Port Grappler** is an excellent, well-sheltered harbor in the Exmouth Promontory, opposite the northeast side of Saumarez Island. Cloue Island, in its entrance, shows so distinctly that it is impossible to mistake the position of this harbor. There is a passage on either side of the island, but the eastern one is the wider and better. The best anchorage for a large vessel is 600 yards inside Cloue Island in 8 to 9 fathoms, mud; but a small vessel may pass Diamond Island and anchor in 4 to 5 fathoms off Allard Point. The holding ground all over the harbor is excellent, but above Diamond Island the shoal water extends farther from the shore and the anchorage ground becomes confined.

**Beacon.**—A beacon, consisting of a square board painted in black and white horizontal bands stands on the summit of Cloue Island.

**Indian Reach.**—The southern part of Messier Channel, for 25 miles between Saumarez Island and English Narrows, is named Indian Reach, in which are several islets and straggling rocks, with deep water between.

**Caution.**—The buoys and beacons in Indian Reach can not be depended on to be in position.

**Port Horacio,** on the west shore of Indian Reach, 6 miles north of Saumarez Island, has not been surveyed, and although affording anchorage for small vessels, several sunken dangers are known to exist.

**Dolores Reef,** the greater part of which covers at high water, lies nearly 350 yards from the southeast point of Elliott Peninsula or the southwest entrance point to Grau Cove. It is about 65 yards in extent and joined to the peninsula by a ledge of rocks, having from 6 to 12 feet water over it and 15 to 19 fathoms close around.

**Grau Cove,** on the southeast side of Elliott Peninsula, is a sheltered anchorage nearly 600 yards wide at its entrance, and about ¼ mile deep. The shores of the cove are free from outlying dangers, and anchorage may be taken up in the center in 16 fathoms, rocky bottom.

**Fantome Island.**—The *Fantome* found anchorage for a night under Fantome Island, ⅓ mile south-southeast from Crossover Island on the west side of Indian Reach, in 28 fathoms sand, shell, and rock, with the extremes of Fantome Island bearing 342°, and 16°. From an examination it was found that anchorage may be obtained nearer Fantome Island.

**Covadonga Group** consists of several small islands, situated nearly in mid-channel between Crossover Island and Port Riofrio. They are all wooded with the exception of South Rocks, which lie

0.9 mile north from Crossover Island, are 8 feet above high water, and marked by a perch, consisting of a staff and barrel, painted in red and white bands; it is not easily made out.

**Abtao Shoal,** with 12 feet water on it, lies 200 yards south of South Rocks. During the *Alert's* survey in 1880, kelp was growing in 9 fathoms in this neighborhood.

**Buoy.**—A red can buoy with the name "Abtao" on it in white letters surmounted by staff with conical topmark, is moored in 14¾ fathoms water, to the southward of the rock.

**Sister Islands** are two small islands, 25 feet high, eastward of the Covadonga Group, having a safe passage between them and the shore of Exmouth Promontory.

**Penguin Rock,** 600 yards 45° from Toro Island, uncovers about 2 feet at low water.

**Vaudreuil Rock,** ¾ mile 4° from Toro Island, is very dangerous. It is but slightly marked by kelp and difficult to distinguish at all times. It has not been seen to uncover at low-water springs. The lead is no guide, there being a great depth of water within a distance of 400 yards of it.

A perch with a white ball and black vane stands on the rock; it is difficult to distinguish.

**Port Riofrio,** 4 miles north of Crossover Island, is a useful anchorage for a vessel unable to reach Eden Harbor before dark.

**Covadonga Rock** lies in mid-channel of the entrance, but only just covers at high water.

It is marked by a red beacon 15 feet in height, surmounted by a ball, and a small beacon marks a rock awash, lying 65 yards northwest of it.

**Directions.**—Steer between Alvaro Point and Covadonga Rock, with the cascade bearing 283°. After passing the rock, haul to the northward and anchor 300 yards north of Harbor Point in 21 fathoms, mud.

There is no passage for vessels through Manuel Passage between Marta Island and the west shore.

**Supplies.**—Fish are plentiful in the bight south of Vitalia Islands; also south of Cascade Point.

**Gorgon Reef,** on the western side of the reach, 800 yards offshore and 1¾ miles north of Alvaro Point, covers at high water. Vessels should keep the east shore aboard when passing this danger.

**Beacon.**—The beacon on this reef consists of a pole surmounted by a ball, and is painted red.

**Guia Islands** are low islets close off Clarke Point. A beacon, white, with a red ball topmark, is erected upon the northernmost islet, which will be useful as a mark to clear Gorgon Reef.

**Directions.**—The eastern channel between Sister Islands and Exmouth Promontory is to be preferred, especially in thick weather, when it is difficult to judge the distance from South Rocks.

If using the west channel, care must be exercised in rounding South Rocks, as the ebb stream sets directly onto them and over the 12-foot patch lying to the southward of them.

**Lackawana Cove,** just south of Eden Harbor, is perfectly sheltered, with an entrance only 50 yards across. There is a rock with 2 fathoms of water over it in the middle.

**Eden Harbor** is formed by a group of thickly wooded islands on the western shore of Indian Reach, at 3½ miles north of Port Riofrio, and affords good anchorage in 8 to 12 fathoms. Vessels from the northward may enter through East Channel between Morton and Dulce Islands, but the better entrance is through South Channel, midway between Charles Island and Hammond Reef. When in the entrance, Jenkins Hill, 445 feet high, kept in line with the west extreme of Eden Island, bearing 344°, leads clear of both Hammond Reef and the rocks extending from Charles Island. The best anchorage is between Eden Island and a small beach northwest of it in 12 to 14 fathoms, taking care not to get too close to Bare Rocks, marked by a white post beacon off Eden Island. This anchorage is available for large vessels awaiting slack water in English Narrows. Farther in is Malacca Cove, perfectly sheltered but very confined, with anchorage in 7 fathoms, mud.

**Hammond Reef Buoy,** can, black, is moored northward of Hammond Reef in a depth of 6 fathoms, with Greville Point bearing 105°, distant 500 yards.

**Charles Island Beacon** stands on the summit of the island. It is 33 feet high, pyramidal in shape, with a ball on top, the whole painted white with a red band around the middle.

**Hermia Rock.**—The German steamer *Hermia* struck on a rock with 12 feet of water over it off William Point. It is said to lie 335 yards south of the point. Vessels using East Channel should exercise caution, as the rock is surrounded by deep water.

**Wreck.**—A steamer was wrecked in 1894 south of William Point, entrance to Eden Harbor, apparently on the rock whereon the *Hermia* struck.

**Tides.**—High water, full and change, in Eden Harbor is at 15m.; springs rise 6 feet.

**Level Bay,** opposite Eden Harbor, can scarcely be called an anchorage, and certainly does not deserve the name, as the bottom is anything but level. With Eden Harbor so near it is quite useless.

**Morales Rock,** with 5½ fathoms over it and 9 fathoms around, lies 300 yards 155° from Point Astorga, the south extreme of Halliday Point.

**Reported rock.**—The steamer *South Africa* is reported to have touched on a rock 1,150 yards 20° from the southeast point of Henry Island, but the danger has since been unsuccessfully searched for, the least depth found in the locality being 12 fathoms, and therefore the existence of the rock is doubtful. Vessels, however, should use every precaution in passing through this channel, and should avoid near approach to any kelp which may be seen.

**Harwood and Henry Islands,** about 1½ miles north of Eden Harbor, are separated from Salamander Island by a channel having depths of only 1 to 2 fathoms, and blocked by kelp, and therefore unfit for navigation.

**Rock.**—A rock on which the steamer *Capac* struck in 1897 lies 200 yards, 11°, from the north extremity of Harwood Island. The rock has 10 feet of water on it, and 7½ to 12 fathoms close around.

**Buoy.**—A black cylindrical buoy, with "Capac" on it in white letters and carrying a basket topmark, is moored close northward of the rock.

**Valverde Shoal,** marked by kelp, is about 260 yards 312° from Capac Rock and 180 yards north of the West Harwood Island. It has 19 feet of water on it, and is surrounded by 9 to 11 fathoms, with 11 to 16 fathoms between it and Capac Rock.

**Pascua Rock,** about 200 feet in extent, with 19 feet of water on it, lies close to the track recommended, about 750 yards 284° from Halliday Point. It is steep-to and well marked by kelp. Between this rock and the coast there is a depth of 16 to 19 fathoms.

**Buoy.**—A red conical buoy with the name in white letters and surmounted by a staff and conical topmark, is moored, in a depth of 6½ fathoms, to the southwestward of the rock. The route recommended lies between Pascua Rock and Capac Shoal. The position of the buoys must not be relied on.

**Leading mark.**—Eve Point in line with the western extreme of Adam Island, bearing 315°, leads between Capac Shoal and Pascua Rock.

**Bories Rock,** with 3 feet on it and surrounded by deep water, lies about 750 yards 8° from Pascua Rock and 950 yards 166° from Paradise Point.

**Duke of Edinburgh Sound,** known also as Rondizzoni Bay, east of the southern entrance to English Narrows, was explored by the officers of the Chilean vessel of war *Magallanes*, and is said to be free from dangers. No bottom with 35 fathoms could be found in the middle of the sound, or any anchorage ground around the shores. The hills in the vicinity of the sound rise to about 700 and 1,000 feet, except at the northern extremity, where the land is low.

ENGLISH NARROWS.

**Directions.**—Except when passing Zealous Shoal and the sharp turn at Mid Channel Island these narrows present no difficulty, and even in the narrowest part, 200 yards in width, there is no danger unless a vessel goes through with wind and tide, which should never be attempted if the wind is strong.

The tides run 6 knots at springs in this part, and as the channel is winding it is, during springs, always advisable to await slack water.

**From the southward.**—After passing Memphis Shoal and Adam Island in the southern entrance, the eastern shore should be kept aboard until Kitt Island is approached, then give Kitt Island a wide berth, as there is a small rock lying about 200 yards off it; then keep about 300 yards off Chinnock Island to avoid Lookout Shoal. After passing Chinnock Island keep over toward the eastern shore to clear the rocky patch (Mindful Shoal) off Croft Island. When clear of this danger the vessel should cross gradually to the western shore and follow it around while passing Mid Channel Island. Should the tidal current be setting to the southward care must be taken not to let it cant the vessel's head inshore. Close attention is necessary passing Zealous Island, for the tide may set strongly onto Zealous Shoal, even though it appears to be slack water. If the current is running to the northward the helm must be ported quickly after passing Mid Channel Island, so as not to be set on Caution Shoal. If the eastern channel is taken the island shore must be kept close aboard, as Danger Shoal extends for some distance from Cedar Point.

After Clio Islet and Cedar Point are passed the channel is perfectly clear the whole way to Gulf of Penas, but the tidal currents have considerable strength until Cavour and Lamarmora Islands are passed.

**From the northward.**—In making the narrows from the northward the same care must be taken to avoid the shoal water off Clio Islet and Cedar Point, and being set on Zealous Shoal. As stated before, the passage should not be attempted with the wind and tide, if the former is very strong. At the back of Moat Island there is a remarkable grayish patch resembling a castle which, if steered for after passing Direction Islands, will lead to the northern entrance.

**Regulation for vessels passing through.**—As in passing through English Narrows it is advisable to wait for slack tide, and, as, consequently, vessels bound in opposite directions (being unable to see each other) might meet in the critical part of the channel, it has been arranged between certain companies, whose vessels constantly use the inner Patagonian route, that when nearing the English Narrows ships should either fire a gun or sound their steam

whistles; and that should vessels bound north meet vessels bound in the opposite direction the ships bound north shall wait until the southward-bound vessels have cleared the Narrows.

As this appears to be a prudent course to adopt in view of the difficult navigation and limited time of slack water, all mariners should regulate their movements in accordance with it.

**Tides.**—High water, full and change, in English Narrows is at 15m.; springs rise 6 feet.

The streams of the flood and ebb are considered to run for about three-quarters of an hour after high and low water by the shore, but they have much greater force than elsewhere in the channels. At springs the stream has a velocity of 6 knots an hour past Mid Channel Island. At the northern entrance the flood stream sets across the channel from the northwest point of Cavour Island. Care should be taken to avoid being swept on the shore of Loney Island.

**Memphis Shoal,** on the eastern side, at the south entrance to English Narrows, is an isolated shoal, about 100 yards in extent, with a depth over it varying from 7 to 28 feet, gradually deepening all around. The shoal is surrounded by kelp, which is only plainly seen at change of tide. It lies 750 yards 55° from Eve Point (Bishopp Island).

**Buoy.**—A red conical buoy, with "Memphis" on it in white letters, is moored on the northern edge of Memphis Shoal.

**Port Simpson.**—On the western shore of English Narrows, and about 8 miles northward of Eden Harbor, is Beauchamp Inlet, 1¼ miles long west and east, and ¾ mile wide at its entrance; at ¼ mile within the entrance there is a depth of 40 fathoms near the center, and 9 to 11 fathoms, mud bottom, near the entrance of Port Simpson, which lies between Henry and Robert Points at the head of Beauchamp Inlet, and is 150 yards wide, with 6 to 10 fathoms water. The navigable channel is, however, contracted to about 100 yards by the rocky shoal extending from Robert Point, on the north side.

**Elena Rock.**—This rock, with a depth of 19 feet, is situated in the entrance to Port Simpson, at a distance of about 100 yards, 27° from Stoddart Point.

**Buoy.**—A red conical buoy, marked "Elena," is established close south of this rock.

Vessels should pass southward of this buoy. The channel is about 70 yards wide at this point.

Port Simpson affords secure anchorage in 8 to 24 fathoms, mud bottom. Just inside the entrance and about midway between Stoddart Point on the south and a remarkable white patch on the face of a cliff on the north shore there is a depth of 24 fathoms, decreas-

ing to 9 and 7 fathoms abreast of Hellen Point, thence 9 to 4 fathoms to the head of the port, where there is a stream from which good water can be obtained. Over the bar of this stream there is a depth of about 7 feet at high water.

Wood suitable for steaming purposes can be had, that of the best quality just eastward of Hellen Point.

**Florida Shoal** is in the western part of Beauchamp Inlet. The eastern extreme of this shoal has a depth of 12 feet over it and lies 750 yards 44° from Robert Point. About 100 yards northward and eastward of this position there are 22 fathoms or more of water, but immediately to the westward it shoals suddenly to 3 fathoms, and then 2 fathoms, forming an extensive detached bank extending to the shore northward and westward. The spot on which the *Gulf of Florida* touched is on the edge and just northward of the eastern extremity of this bank.

**Tides.**—High water, full and change, in Port Simpson is at 15m.; springs rise about 6 feet.

**Lucas Cove,** on the eastern shore, opposite Beauchamp Inlet, is a good anchorage for any but very large vessels. If night comes on, or too strong a tide current and wind forbid the passage of the Narrows, it will save the return to Eden Harbor. The entrance is south of Chinnock Island, and although it is very much narrowed by the kelp which extends off the south point of the island, it has 4 fathoms in the channel, and no danger if the southern or mainland shore is kept aboard. The anchorage is in the center in 10 to 11 fathoms water, bottom of mud. There is anchorage outside the cove in about 20 fathoms water.

**Lookout Shoal Buoy,** cylindrical, black, with the name "Lookout" in white letters, lies in 26 feet water on Lookout Shoal.

**Mindful Shoal Buoy,** cylindrical, black, with the name "Mindful" in white letters, is moored in 24 feet water on Mindful Shoal.

**Zealous Shoal Buoy,** conical, red, with the name "Zealous" in white letters, lies in 7 fathoms water, with the center of Zealous Islet bearing 61°, distant 200 yards.

**Caution.**—On the 22d of December, 1872, at the period of neap tides, the *Zealous*, on her passage to the southward through the English Narrows, at about an hour before low water by the shore, was swept by the ebb tide from the southward onto a sunken rock, with 17 feet, lying about 100 yards to the southward of Zealous Islet, off the eastern shore. The islet lies nearly ½ mile south of Mid-Channel Island.

The wreck of the steamer *Roma* (the masts of which do not show even at low water), lying northward of Zealous Islet, presents a danger to shipping passing through English Narrows. The exact position of the wreck is not known.

Mariners are therefore recommended, when proceeding through this part of the English Narrows, to keep on the western shore, and in steamers to regulate their speed, in order to have the vessel fully under command, bearing in mind that the ebb tide sets strongly on to Zealous Islet from the opposite side of the channel.

Large vessels waiting the tide in English Narrows should anchor in Eden Harbor if from the southward or in Gray Harbor or Solfernio Bay if from the northward.

**Mid Channel Island.**—Close to the south end of Mid Channel Island are detached rocks (Hall Rocks) awash, and beyond these kelp extends for some distance.

The channel on either side of the island may be used, but a large vessel should take the western, which is the wider and deeper of the two and the least affected by the tide.

**Beacons.**—Two beacons have been erected on Mid Channel Island, one on the north point and the other on the south point of the island.

The north beacon, about 11 feet high, consists of an iron tripod, the north face covered with iron plates, and the two corresponding legs, or supports, being prolonged, forming a V above the vertex.

The south beacon, about 14 feet high, is similar to the north beacon, its south face being covered, but the prolonged legs are bent, forming a circle above the vertex.

Both beacons are painted white.

**Cedar Shoal Buoy,** conical, red, with the name "Cedar" in white letters, marks the shoal extending from Cedar Point.

**Caution Shoal** consists of several shoal heads lying southeastward of Patagonia Island and Clio Islet. A 4-fathom head lies 460 yards 91° from Clio Islet; a 2½-fathom head lies 150 yards 135° from the south point of Patagonia Island; another, with 13 feet water over it was reported to exist at 300 yards 116° from Clio Islet, but a careful examination of the spot failed to locate it.

**Buoys.**—A black cylindrical buoy, carrying a cylindrical topmark and named North Caution, is moored in 5½ fathoms, on the northeastern side of the 4-fathom head.

South Caution Buoy, moored in 6½ fathoms, 250 yards 122° from Clio Islet, is cylindrical, black, with cylindrical topmark, and marks the southeastern edge of Caution Shoal.

**Solferino Bay.**—The *Solace* found comfortable anchorage here, in 30 fathoms, about midway between Caution Shoal and the small island to the eastward. Although the spring-tide current ran with great velocity past the buoy, sometimes dragging it completely under water, there was scarcely any current at the ship, and the cable hung up and down. The ship stayed here during a gale, but no sea was raised, although the williwaws were violent; the dragging of the

cable over the uneven, rocky bottom as the vessel yawed was rather startling but did no damage.

**Cavour Island.**—The pyramidal beacon on the summit of Cavour Island is painted in red and white bands; the framework globe above it is white. This beacon is intended for a refuge beacon. It may be seen in clear weather from the northward for a distance of about 20 miles.

**Caution.**—The buoys in the Patagonian Channels are frequently out of place or missing, and reliance should not be placed upon them, nor upon the beacons.

**Hoskyn Cove,** on the west side of the northern entrance of English Narrows, would answer the same purpose to the southward-bound vessel as Lucas Cove does to those northward bound. It is formed by Lamarmora Island, joined to the mainland at low water; a remarkable round islet (Loney Islet) showing as the extreme on the west side after passing the narrows, marks its entrance unmistakably. The best anchorage is in the middle of the cove in 13 fathoms, mud, or when Loney Islet is shut in by John Point, where, though a considerable tide is felt when near the time of high water, a vessel may lie in safety. Care must be taken when entering or leaving, as the tide sweeps rapidly past Loney Islet, and catches the vessel's bow or stern, while her other end is in the dead water occasioned by the island.

At 300 yards 90° from Elizabeth Point, the south entrance point of Hoskyn Cove, is a rocky patch, on which the least water found was 9 fathoms, with kelp extending about 100 yards beyond it. John Point on the northern shore is steep-to. The only drawback to Hoskyn Cove is the very strong tide which sweeps past its entrance, but for a moderate-sized vessel it is far preferable to Halt Bay. Just outside the cove the channel is only 300 yards wide, but both shores are steep-to, and after passing this narrow part Messier Channel opens out.

### MESSIER CHANNEL.

**Remarks.**—From the north entrance of English Narrows to the outlet of Messier Channel at Tarn Bay in the Gulf of Penas, a distance of 75 miles, the land on both sides of this channel is mountainous, with lofty snow-capped peaks. It is quite open, has several bold headlands, indentations, and islands, but free from all impediments, except for Cotopaxi Rock.

The navigation is perfectly easy in moderately fine weather; the real difficulty of it consists in the almost perpetual rain, thick weather, and strong gales, with very heavy williwaws, which come down the steep mountain sides with a force which must be felt to be believed.

**Entrance Rock** is low and flat, on the north side of the entrance to Magenta Bay, and 350 yards south of Elizabeth Island. From the prominent position of the rock it is a good mark for pointing out the direction of the north entrance to the English Narrows.

**Thomas Island,** on the west side of the south entrance to Messier Channel, when seen from the north, may be known by a well-defined peak near the center, terminating in a low point near the eastern extremity.

**Moat Island,** about 600 yards northwest of Thomas Island, has three peaks lying in a north and south direction; the center one is the highest (380 feet).

**Halt Bay,** on the eastern shore, at the commencement of Messier Channel, has been much used by ships passing through, but the water is very deep and the space confined, so that Gray Harbor and Hoskyn Cove should entirely supersede it.

**Gray Harbor** affords excellent anchorage at the head of Liberta Bay, 2 miles southeast of Halt Bay, where a vessel may lie in security in 16 to 17 fathoms, with a botton of stiff mud. Large vessels must moor.

Coming from the southward the Armingen Islands may be rounded close-to and the northeast part of Liberta Bay steered for until the entrance to the harbor opens. From the northward the eastern shore should be followed past Halt Bay into the harbor. Julia Island and Green Islet, on the south side of Liberta Bay, must not be approached too closely, as there are rocks lying about 200 yards off each of them. At the head of Gray Harbor is a large lagoon which may be entered by a boat at high water.

**Beacons.**—A beacon, consisting of a square iron plate, painted black and white in horizontal bands, 65 feet above high water, stands on the northern summit of the peninsula which forms the western side of Gray Harbor.

On Toro Rock, about 150 yards northwest of Green Islet, stands a red beacon surmounted by a ball.

Talisman Rock, situated nearly ½ mile within the entrance of the harbor, is marked by a white iron pole surmounted by a ball.

### SOUTH REACH.

**Seymour Inlet,** on the western shore, nearly 3 miles northwest of Moat Island, is about ½ mile wide at the entrance, with two islets just inside the south point.

**Daly Island,** nearly ½ mile north of Seymour Inlet, is 175 feet high, and when seen from the north its outline appears to be rounded near the center, and the east and west extremities bluff points.

**Ommanney Point,** on the eastern shore, 2½ miles northeast of Daly Island, is low, rocky, and wooded.

**Marcus Island** is a small, flat-topped island 95 feet high, with some stunted bushes on it, 4 miles north of Daly Island.

**Cotopaxi Rock,** near the middle of the reach, at 3½ miles north of Marcus Island, has 19 feet on it at high water, is 100 yards long and 50 yards broad; kelp above water is perceptible only when the water is smooth. Midge Island, its breadth open eastward of Direction Island, leads clear of Cotopaxi Rock.

**Buoy.**—A cylindrical buoy, painted black, with the name "Cotopaxi" in white letters, lies in 5½ fathoms water with the southwest point of Williams Island bearing 101°, distant about 1⅛ miles. Vessels should pass between the buoy (if in position) and Williams Island.

**Direction Islet,** 70 feet high, small and thickly wooded, lies nearly in mid-channel 15 miles north of English Narrows. A ledge, with from 13 to 23 feet over it, extends 400 yards in a northerly direction from this islet.

**Latorre (Adalbert) Channel** is a continuation of what was formerly known as Search Inlet. It trends westerly 18 miles and joins Fallos Channel. At 12 miles from its eastern entrance the channel is divided by Riquelme Island, the southern arm being named Albatross (Erhardt) Channel, which is not recommended, having in its narrower part rocks and islets.

**Estero Ultimo** is an arm of Latorre Channel and can be navigated by any sized vessel, but is otherwise unimportant.

**Schroder Ground,** in Estero Ultimo, 2¼ miles south of Search Inlet, affords anchorage in about 10 fathoms water.

**Port Albatross (Kaiser Harbor),** on the east side of Albatross (Erhardt) Channel, at 2 miles southwest of the east extreme of Riquelme Island, has anchorage at its head in about 10 fathoms, but is too confined for large vessels.

**Heinrichs Fiord,** on the north side of Latorre Channel, just within the western entrance, affords anchorage in 16 fathoms, mud, about 1¾ miles within the entrance; anchorage may also be obtained in about 20 fathoms about ¾ mile within.

**Thornton Peninsula** has a bold, rocky appearance, with a table-topped mountain in the center, wooded to the summit, upon which is a straggling line of trees. A rock that dries 2 feet lies about 400 yards from its northwest point.

**White Kelp Cove,** 10 miles north of Direction Islet, on the north side of and about 1 mile within Lion Bay, is very confined, and not nearly so good as Connor Cove, which is close by. No other anchorage could be found in Lion Bay.

**Connor Cove,** on the same shore, 2 miles north of Lion Bay, is a convenient anchorage, apparently without danger. The anchorage

is in the middle in 13 fathoms, stiff mud. A large vessel would have to moor to have swinging room.

**Boyle Rock,** which lies rather more than a mile off Connor Cove, is awash at low water, and is well marked by kelp.

**Middle Island** has two peaks, the northern about 2,200 feet high and the southern about 2,100, very conspicuous from the northward, being visible as soon as a vessel enters Messier Channel. Its shores are steep-to and it can be passed on either side

**Waterfall Bay,** 11 miles north of Middle Island, lies at the entrance of Vander Meulen Inlet, on the east side of the channel. It affords very indifferent anchorage, with scarcely any shelter. Island Harbor or Connor Cove are preferable anchorages.

**Cocks Head,** the west entrance point of Waterfall Bay, appears as a steep cliff with a smooth top when seen from the southward.

**Island Harbor,** on the eastern shore, 12 miles northward of Cocks Head, is a small anchorage, convenient for vessels entering or leaving Messier Channel. There is good holding ground, plenty of wood and water close at hand, and at times abundance of fish. Its position is marked by Lizard Island, a short mile to the southward, and near the entrance are two small islands named Brown and Phipps Islands. A bank or bar of rocky ground stretches across from Phipps Island to the main on each side, having 8 fathoms on it in mid-channel and shoaling gradually to 3 or 4 fathoms on either side close to the rocks.

The island may be passed on either side, but the north passage is the straighter. There is a patch with 2¼ fathoms on it about 100 yards south of Phipps Island and a group of rocky islands, surrounded by kelp, off the south point of the main.

The anchorage is in 19 fathoms, rather more than 200 yards north of Phipps Island. A small vessel may go into the inner basin and anchor in 10 fathoms close to the large waterfall at the head of the bight, but her stern must be secured to the trees, as there is not room to swing. There is an anchorage outside of the harbor in 15 fathoms of water, with Fleuriais Point bearing 353° and the south point of Phipps Island 60°.

The commanding officer of the U. S. S. *Pinta* (in 1884) reports that Island Harbor is a bad anchorage in bad weather and is difficult to get out of owing to a torrent and the wind always causing the vessel to ride with head up the harbor; there is scant room to turn without a spring. The land is low to the northward and westward and very high in the opposite direction; therefore there is little protection from prevailing gales. They rode out two gales there, force 5 to 12, dragged two anchors, and had to steam up to them most of one day and all of one night. The water was smooth enough, but some of the squalls were terrific.

**Cortes Ojea (Albatross) Channel** joins Toro and Fallos Channels. It runs for about 12 miles in a southwesterly direction, and is throughout wide and deep, its navigation offering no difficulty whatever.

**Toro Channel** connects Hornby Sound with Cortes Ojea Channel. It is deep throughout, and without anchorage. In its northern part the width is between 1 and 2 miles and diminishes gradualy toward Deutsche Narrows at its southern end. Toro and Cortes Ojea Channels separate the two large islands named Prat and Serrano, respectively.

**Deutsche Narrows**, at 13 miles south of the entrance to Hornby Sound, are only 200 yards wide from shore to shore, through which the streams were found to run 2 knots and to turn irregularly. The channel eastward of Guia (Pommer) Island, in the south entrance of the narrows, was observed to be full of kelp, so that vessels must keep the western shore aboard after passing through to the southward.

**Dreising Bay**, about 3 miles westward of Deutsche Narrows, affords anchorage in 16 to 18 fathoms water about 1 mile within the entrance.

In Schlucht Passage, at 2 miles west of the northern entrance to Albatross Channel, anchorage was obtained in 14 fathoms at 300 yards east of Bachem Point.

**Estero Engañoso (Otto Fiord)** is a branch of Hornby Sound. It runs in a northwesterly direction, and its first 8 miles are navigable for any draft, but farther on it becomes too narrow for handling a ship of even small size. It is of no importance to navigation.

**Barbarossa Channel** is the channel northward of Prat (Prince Heinrich) Island, joining Hornby Sound with Fallos Channel near its north end and southward of Ursula Island.

**Millar Island**, on the west side of Messier Channel, and about 6 miles inside the north entrance, has a range of mountains extending from end to end. The highest, 2,439 feet, is very conspicuous when approaching from the north.

**Caution.**—Care should be taken not to pass to the westward of the track recommended for the passage of this part of Messier Channel, as the southeastern extremity of Millar Island is reported to extend farther to the eastward than the charts indicate.

**Fatal Bay**, on the western shore of Messier Channel, about 10 miles north of Hornby Sound, being quite unsheltered, with 25 fathoms close to the rocks, does not deserve the name of an anchorage. Immediately inside Fatal Bay is a small cove with a narrow entrance and deep water inside.

**Baker Islands**, consisting of three large and several smaller islands, are on the east side of the northern entrance to Messier

Channel. Zealous Island, the westernmost of the three large islands, is about 3,000 feet high, and its western shore is fronted by several small islands.

The passage between Zealous and Sombrero Islands is clear of dangers.

**Hale Cove,** on the west side of Orlebar Island, has sheltered anchorage in 16 to 17 fathoms, mud, and is marked by two small islets off its entrance. Passing inside the outer islands, which lie about a mile from it, the two small islets will be seen, and as they are passed the entrance to this harbor will open out. Anchorage may be had outside the cove, but it is not well sheltered, and the bottom is rocky.

**Marks.**—In Hale Cove are three patches of gray bare rock on the side of Mount Orlebar, nearly abreast of the anchorage, but farther in over the head of the cove and higher up is one remarkable, vertical, long, white stripe. This single stripe is the most noticeable mark in the harbor, and is seen from the southward before the entrance is opened.

**Scout Channel,** off Hale Cove and between Scylla and Scout Islands, is a safe passage, with a width of 50 yards and the shores quite steep-to. It may be useful for a vessel much pressed for time when coming from the northward, as she would save about 1½ miles.

**Penguin Island,** on the west side of the entrance to Messier Channel, has a flat top about the same height as the foreshore of Juan Stuven Island, and appears from seaward to form a part of the lowland extending from it. It may be approached safely on its eastern side within 1 mile. On the western side the outer danger is a rock 5 feet high, with deep water close-to, lying about 1 mile northwest of the north point of the island.

Vessels using the Southwest Pass should keep Wager Island aboard.

**Sombrero Island,** on the east side of entrance to Messier Channel, is 1,539 feet high and has a remarkable rounded appearance when seen from seaward. On approaching it a low and regular foreshore will be seen.

**Baker and Martinez Channels,** opening into Messier Channel on either side of the Baker Islands, run in an easterly direction for about 60 miles, with generally very deep water, but there are several anchorages, the plans of which are shown on chart No. 2051.

**Tarn Bay,** in which the channels from Magellan Strait open into the Gulf of Peñas, is about 15 miles wide, having the Ayautau Islands on its eastern side 5 miles from the mainland. On the coast abreast the islands there is a port called by the missionary voyagers San Policarpo, but it is exposed to the westward.

San Pedro Island is reported to be about 1 mile to the eastward of its charted position, and Point Oscar about 2 miles to the west-

ward, making the entrance to Messier Channel narrower than the charts indicate.

**Ayautau Islands,** the largest of which is about 750 feet high, serve as an excellent mark to steer for in making Messier Channel from the Gulf of Peñas, all the small islands of the western point of entrance being low, while the eastern shore shows an abrupt mountainous outline. Directly the entrance is passed both shores are of the same high rugged character, with numerous peaks and capes, but all alike in character, and succeeding each other so rapidly that it would not be easy to distinguish them separately, nor, indeed, is it necessary, so perfectly clear is the channel at this part. The space between the islands and the mainland appears to be foul.

**Sakkarah Rock.**—A sharp pinnacle rock, with 26 feet of water over it and 5½ to 12 fathoms around, lies a little over 3 miles 200° from the summit of the southern of the Ayautau Islands.

**Guaianeco Islands,** off the north end of Juan Stuven Island, are 20 miles in extent, and consist of two principal islands and many smaller ones. The westernmost is called Byron Island and the easternmost Wager Island. They are separated by Rundle Pass, at the northern end of which is Speedwell Bay. Rundle Pass is only ¼ mile wide, but clear in the whole extent of its channel, excepting the northern entrance, where it is guarded by many detached rocks, which render the entrance to Speedwell Bay rather difficult.

**Wager and Byron Islands** are both high, and, with the Ayautau Islands, mark the entrance to the channel well. Wager Island may be recognized by Mount Anson, 1,436 feet high and conical, and Wager Mountain, 2,139 feet high, with a flat top, about 2 miles south of Mount Anson. Both are easily made out from the westward at a distance of 30 or 40 miles.

**Port Ballenas.**—If after reaching Tarn Bay the vessel should be met by a strong foul wind, or the still more common occurrence of a heavy westerly sea into the Gulf of Peñas, and she has not time to reach Port Barroso (Port Otway), a fairly good anchorage may be had under the lee of Wager Island, in what is believed to be the Puerto Ballenas of Machado, who was a pilot in the days when Chile was a Spanish Colony. This anchorage is the first deep indentation on the southeastern side of Wager Island. The space is confined and the bottom uneven and rocky, but it is quite sheltered by the island from all northerly and northwesterly winds, and no sea can get up there. A depth of 11 fathoms may be had on the west side off a small islet, with just room to swing.

**Puerto Chico,** 2 miles to the westward of the southeast point of Wager Island, is a cove 600 yards deep and about as wide, in which small craft can find shelter. The anchorage is in the middle of the cove in 17 fathoms. The head of the cove is full of kelp.

**Tides.**—In the northern part of Messier Channel the tides are regular, running 6½ hours each way. The flood stream sets northward and the ebb southward, but their strength is so small as not to affect navigation.

THE OUTER ROUTE, EASTWARD OF MORNINGTON AND CAMPAÑA ISLANDS.

From an exploration by the German vessel *Albatross* in 1883–84, as an alternative to the route by Wide Channel, English Narrows, and Messier Channel, it was proved that ships can gain the Gulf of Penas by Trinidad, Picton, Stosch, and Fallos Channels. The latter route is slightly longer than that hitherto adopted. Capt. Pluddeman, who explored this route, states that it is preferable for large vessels. This opinion from the officer who has made a survey of it must be considered with respect, and no doubt in moderate weather is amply justified, but an examination of the chart shows that the bar across the northern end of Picton Channel has a greatest depth of 34 feet in a pass, 350 yards wide at the most, which is bounded on either side by much shoaler water, and has no prominent leading mark.

As this bar is inadequately protected from the heavy sea setting on the coast in northwesterly gales it would appear that the report previously made by the officers of the British vessel *Alert* "that the heavy sea would break on the bar in bad weather" can not be disregarded, and the possibility of difficulties and delays at this spot points to the conclusion that the inner route is on the whole preferable.

**Picton Channel,** with an average breadth of 1½ miles, extends to the northward and westward for about 20 miles, with bold shores intersected by inlets on either side and deep water in mid-channel. Mornington Island, the western shore, then becomes low and dips gradually to the northward till it ends 36 miles from Trinidad Channel in an extensive area of rocks, islets, and disconnected breakers, with no prominent islets fit for leading marks to guide a vessel through the channels to the sea.

The seaward face of the land consists of numerous reefs and rocks extending the whole distance from Cape Pakenham to Vorposten Island at 20 miles farther north, where there is an apparent break of 6 to 7 miles. The reefs commence again at Cape Montague and extend thence apparently to Western Rock. Picton Channel, which has at its southern end a depth of 145 fathoms, shoals toward its northern end to the bar above mentioned.

**Payne Bay** is on the west shore, 15 miles from the south entrance. The *Alert* rode out a very heavy gale for two days here in 9 fathoms, sand. Southwestward of Payne Bay a narrow opening, having 2 fathoms water in mid-channel, leads into an extensive lagoon, apparently extending to Bossi Bight.

**Clara Bay,** at the northern entrance to Seaview Channel, on the northern shore of Mornington Island, has extensive anchoring ground in 6 to 16 fathoms on a bank extending southward and eastward from Emma Island; also on that extending northwestward from Gerd Island. No anchorage could be found either in Eversfield or Cohen Fiords, on the opposite side of the channel.

**Flotten Harbor** is formed by islands and shoals, just south of the bar at the northern end of Picton Channel, ¾ mile southwest of Latitude Island; the anchoring ground is about 1 mile north and south, by ½ mile wide, with general depths of 8 or 9 fathoms, fine sandy bottom.

The passage in is close south of Latitude Island; shoal ground, marked by kelp, extends ½ mile from Tang Island on the south side of the passage in.

**Bar.**—Shoal ground extends quite a mile northward and ½ mile northeastward of Latitude Island; the deepest part over the bar is 34 feet on the west side, the limit of the safe passage being well marked by kelp. The passage having the above depth is at the most 350 feet wide, having shallower water on either side. The swell is heavy and would probably break in bad weather.

**Spengler Bight,** 4½ miles northward of Latitude Island, has an anchorage in 5 fathoms, just inside of some rocks at the entrance. At the head of the bight is a portage used by Indians to transport their canoes into Klippen Fiord.

**Stortebecker Breaker** is the northern known danger on the western side of Picton Channel.

**Ladrillero (Stosch) Channel,** north of Picton Channel and on the west of Wellington Island, is a continuation of the route by way of Picton Channel. It is the lower part of Fallos Channel, and extends to The Knick, a distance of about 25 miles, and has several arms or fiords.

**Estero Desengaño (Falscher Arm),** the last of the esteros which empty into Ladrillero Channel before the junction of the latter with the ocean, extends for about 15 miles in a southeasterly direction, and terminates with an anchorage in about 16 fathoms, mud bottom, with good holding ground. On its east side are the esteros Chico, Roberto, Maldonado, and Adelaida, all of which are without anchorage and unimportant to navigation. On the west side, near its entrance, is Estero Pedregoso (Rocky Fiord), a narrow inlet with many islets, and rocks awash, which make it very dangerous. On the same side farther south are four small esteros in which vessels of any size can find anchorage. The best of these is Port Seguro, nearly opposite to Estero Adelaida. It is perfectly sheltered and has good holding ground in 16 fathoms of water, mud bottom.

**Labyrinth Channel.**—The esteros Inutil, Doña Ana, and Solitario empty into Labyrinth Channel, which is otherwise unimportant. On the eastern shore of Estero Doña Ana is Puerto Bueno, well protected, with good holding ground in about 7 fathoms water, but it is of very limited dimensions.

**Hernan Gallego Channel** connects Machado and Ladrillero Channels and separates Angamos Island from Singular Peninsula. It runs in a southeasterly direction and is easy to navigate, except near its junction with the Machado, where several islands cut up the channel into passes of 200 to 400 yards in width. The channel is deep throughout and offers no anchorage.

**Kosmos Harbor,** at the southern end of Staude Island, 10½ miles from the seaward entrance to Ladrillero (Stosch) Channel, affords anchorage in from 11 to 17 fathoms, but the space is confined.

Outlying rocks are found 300 yards off either point of entrance, and the soundings over the harbor appear irregular.

A small anchorage was found by the *Albatross* in Wilcke Fiord, but none could be discovered around Stubbenkammer Island.

**Fallos Channel** has an average breadth of from 1½ to 2 miles, is deep and clear of rocks, and abounds in anchorages for small vessels.

From The Knick, where Ladrillero Channel terminates, Fallos Channel trends in a northerly direction for 65 miles, where it joins the Gulf of Peñas. It has the great disadvantage of having no anchorage for large vessels near the entrance from that gulf, in case of meeting a northwest gale.

The esteros of Don Jose, Artigas, Sofia, Corto, and Triple have their mouths in Fallos Channel. They are navigable for any class of ships, but near their heads narrow down so as to make the working of a ship difficult. They are unimportant to navigation, having no practical anchorage. Doña Elvira Bay, in Estero Don Jose, is spacious and perfectly sheltered against the winds, but so deep that it can not be used as an anchorage. The Chilean steamer *Toro* found no bottom at 40 fathoms in the center of the bay.

**Machado Channel** branches from Fallos Channeal near The Knick and separates Angamos Island from the continent. It runs in a southerly direction for nearly 30 miles, diminishing in width as it reaches farther south. In its narrow part it is perfectly straight and not difficult to navigate. The five esteros emptying on its east side are unimportant and without anchorage. On the western side of its southern end is Port Abrigado, with excellent anchorage in about 10 fathoms, muddy bottom, and good holding ground.

**Preussische Bay** is on the western shore of The Knick, and is divided into three arms, named, respectively, Konigs Harbor, Bachem Bay, and Deep Bay. The *Albatross* steamed up Bachem Bay, which was found obstructed by rocks.

**Konigs Harbor,** the southwestern arm of Preussische Bay, is 1 mile long in a westerly direction and ¼ mile wide in the widest part. There is well-sheltered anchorage in about 16 fathoms. When steering up Preussische Bay for Konigs Harbor, care must be taken in vessels of heavy draft to avoid Preussische Bank, having 26 feet over it and lying in the middle of the fairway, 1,200 yards eastward of the harbor entrance.

**Port Choros** is 2 miles inside Estero Moluscos, on the western side of Riquelme Island. It is sheltered against all winds excepting those from the southeastward, but it has no good holding ground. It is recommended for smaller craft only.

**Puerto Grande** is on the west side of Fallos Channel, obliquely opposite the entrance to Cortes Ojea Channel, and is spacious enough for the largest vessel. In its center there is 29 fathoms of water over a bed of mud, but anchorage can be obtained in 19 fathoms nearer the northwestern shore. The port is preferably entered by the pass north of Goicolea Island, in which there is 7½ to 11 fathoms of water. In the pass south of the island there is much kelp, and it does not appear to be clear.

Three deep ravines converge at this port which, in bad weather, give passage to strong winds, making the anchorage insecure. For this reason the port can be recommended only in good weather.

**Castillo Channel** (Hesserman Fiord) is less than a mile wide where it connects with Fallos Channel, but afterwards widens out to 2 miles and more. About 10 miles from its junction with Fallos Channel it connects with a small gulf in which are the mouths of various channels running in a southerly direction, among them Sotomayor Channel.

**Sotomayor Channel** was entered, and as far as the vessel went up it was found deep and clear. According to Machado, it connects with Dyneley Bay, and through Castillo Channel and Bastian Fiord with Fallos Channel.

**Albatross Harbor,** on the eastern shore of Fallos Channel, at 22 miles southeastward from Cape Bynoe and 6 miles north of Albatross Channel, was used by the *Albatross*. The outer harbor was found to be too deep for anchorage, but there is good anchorage in the inner harbor.

**Jungfern Ground Anchorage** is described as a temporary anchorage at the mouth of a channel between innumerable islands, situated 3 miles east of Cape Bynoe. It is not recommended, and no other safe anchorage could be found in the neighborhood.

## PATAGONIA—WEST COAST.

**Wind and weather.**—The climate of the coast of Chile between Magellan Strait and the Gulf of Peñas is cold, damp, and tempestu-

ous. The prevailing wind is from the northwest; but if it blows hard from that quarter the wind is very liable to shift suddenly around to the westward, and blow still heavier, raising a mountainous and often a cross sea. These westerly gales, however, do not generaly last long, but shift around to the southward, when the weather, if the barometer rises, will probably clear up. Should they, however, fly back to the northwest again, and the barometer remain low, or oscillate, the weather will doubtless be worse. Easterly winds are of rare occurrence, and, like winds from the southward, are accompanied with fine, clear weather; whereas westerly winds bring with them a constant fall of rain and a quick succession of hard squalls and showers.

Should a vessel be near the coast during these northwesterly gales, it would be advisable to make an offing as quickly as possible, in order to guard against that sudden shift to the westward which is almost certain to ensue. A knowledge, however, of the anchorages in Trinidad Channel, Port Barbara (for small vessels), Port Barroso (formerly Port Otway), and St. Quentin Sound has very much reduced the dangers of the lee shore, and a refuge in either of them will often be preferable to passing a night on the coast during a severe gale.

The barometer falls with northerly and westerly winds, but rises with southerly. It is at its minimum height with northwest winds and at its maximum when the wind is southeast. The temperature is rarely so low as 40°, excepting in the winter months. At Port Barroso, in the Gulf of Peñas, the maximum and minimum for 19 days in the month of June (winter) were, respectively 51° and 27°.

**Tides.**—High water on most parts of this coast takes place within half an hour on either side of noon, at full and change. The stream is inconsiderable, and the rise and fall rarely more than 6 feet.

**The coast** between Cape Victory, the northwest entrance point of Magellan Strait, and Nelson Strait, a distance of about 30 miles, is much broken and intersected by channels leading between the islands of Queen Adelaide Archipelago. At 6½ miles north-northeast of Cape Victory there is a remarkable pyramidal hill named Diana Peak, 3,350 feet high, which in clear weather is visible from the entrance of Magellan Strait. Between Cape Victory and Cape Isabel, at 27 miles north-northwest of it, there are several dangerous rocks. The westernmost of these rocks, on which the sea breaks, is reported to lie 225°, 7½ miles from Beagle Island.

**Port Observacion.**—This port, sheltered from the westward, is situated about 1 mile northeastward of Cape Cortado, the southern extreme of Pacheco Island, Queen Adelaide Archipelago.

It is about 1 mile in extent, with a moderate depth of water, the bottom of sand and shells.

Wood and water can be obtained.

**Lecky Monument,** about 11 miles north-northeast of Cape Victory, is a remarkable isolated, pillar-shaped mountain, 3,600 feet high, forming a conspicuous landmark when approaching Magellan Strait from the northward.

**Cape Isabel,** in latitude 51° 50′ south, longitude 75° 9′ west (approximate), the western cape of Queen Adelaide Archipelago, is a steep, rocky promontory of great height, with a peaked summit and a sharply serrated ridge, having two detached columnar masses of rock.

**Beagle Island,** about 450 feet high and about 4½ miles south of Cape Isabel, is precipitous.

**Cape George,** 1,000 feet high, the southwestern extreme of Cambridge Island, is a bluff point, with a number of detached rocks off its south and southeast shores.

**Nelson Strait** extends in a northeast direction about 40 miles.

**Bahamonde Reef.**—This reef, upon which are three sunken rocks which only break in bad weather, is situated about midway between Cape George and Cape Isabel.

**Milward Rock,** with a depth of 8 feet, is situated about 2½ miles northeastward of Bahamonde Reef.

**Lecky Lookout,** on Cambridge Island, is about 3,800 feet high, and from its superior height to that of any other mountain in the neighborhood is an excellent mark for determining the vessel's position.

**Cape Santa Lucia,** the western point of Cambridge Island, is high and precipitous, with an islet about 3 miles to the southward.

**San Blas Channel, Duck and Duncan Harbors,** and the rocks, reefs, and part of the coast line are laid down on the charts from the oral information received from masters of sailing vessels and from distant observations on board the *Beagle.*

**Outlying dangers.**—Several outlying dangers and islands exist between Cape St. Lucia and Cape Santiago at 50 miles north of it, viz:

**Duncan Rock,** latitude 51° 10′ south, longitude 75° 22′ west.

A conical islet ¾ mile southeastward of Duncan Rock.

White Horse Island, 7 miles east-northeastward of Duncan Rock.

A sunken rock on which, with a high sea running, the water breaks occasionally, is charted 2 miles southward of Duncan Rock.

**Cordillera Reef,** on which the sea breaks heavily, is charted 8 miles to the northward of Duncan Rock. It is about ½ mile in extent and dries about 1½ feet at lowest low water.

**Scout Rocks.**—The northern of these rocks is 33 feet high and situated 3½ miles southwestward of Cape Santiago.

Virago Rock is always covered and situated 2 miles northeastward of Scout Rock, the passage between them being free from dangers.

**Caution.**—Navigators are cautioned that the coast and the offlying dangers between Magellan Strait and the Gulf of Penas have not been closely examined, and that therefore the charts are necessarily imperfect. Too close an approach to this dangerous and inhospitable shore is not advisable.

**Cape Santiago** lies nearly 48 miles north of Cape Santa Lucia, and is the southwestern extremity of Duke of York Island, which is separated from Hanover and Madre Islands by Concepcion Strait and West Channel.

Cape Santiago is located 5½ miles 130° from its charted position in (approximately) latitude 50° 46′ south, longitude 75° 21′ west. A note is placed on the charts to this effect.

The channels separating the Duke of York, Hanover, and Madre Islands communicate with the inshore channels at Inocentes Island, but very little is known about either.

**Port Morales.**—Port Morales is on the west coast of Duke of York Island, immediately south of West Cliff, and being easy of access is a useful port. The outer portion of the port is 3 miles long in an east-northeast direction and 1½ miles broad. The inner portion is 2½ miles long and ½ mile wide and extends in an east-southeast direction.

A rock which bares at low water lies about 1 mile 270° from the southern entrance point, and farther offshore are breakers. The northern side of the entrance to the port and the coast to the northward of West Cliff is lined with shoals and reefs.

These dangers will be avoided by keeping a black rock in the northern part of the bay in line with a 440-foot hill bearing 65°; then keep to the southern side of the bay in order to avoid a sandy shoal showing discolored water extending halfway across the bay from the northern shore.

An anchorage with good holding ground may be found in 33 feet of water in the entrance to the inner portion of the port, with the above-mentioned black rock in line with another about 1½ miles southeastward of it.

The anchorage is in (approximately) latitude 50° 38′ south, longitude 75° 24′ west.

**Madre Island.**—The general direction of the coast line of this island is north and south, with low islands and rocks from 5 to 6 miles offshore until just north of April Peak, where a deep sound extends to the eastward. Horn Peak, about 2,500 feet high, is a very conspicuous object when seen from the northward. All this part of the coast has a different appearance from the shores of Trinidad Channel, being nearly clear of vegetation and of a light-gray color. This is remarkable from seaward and is a good guide when closing the land from the westward.

**Rugged Head** is a detached mass of rock of a pyramidal form lying at the base of the Tudor Range. It is not easily made out when seen from the westward, but from the north or south it appears as a round-topped island and may be further recognized by a peculiar mass of rock resembling a shoe on the slope of the range. (See view on Chart No. 447.)

The remarks about the precautions necessary in approaching the coast south of the Gulf of Trinidad are equally applicable to that north of it.

The seaward face of the land consists of numerous reefs and rocks extending the whole distance from Cape Pakenham to Vorposten Island, where there is an apparent break of from 6 to 7 miles. The reefs commence again at Cape Montague, off which a low, rocky reef extends for more than 6 miles.

The coast north of Cape Montague is broken in many places. There are many rocks, several being at least 10 miles distant, with deep water around them; many are dry, some awash, and others show only by the breaking of the sea.

**Cotopaxi Rock.**—This rock, which covers, and only occasionally breaks, is situated 321° from Cape Pakenham, distant 11½ miles.

**Maipo Rock.**—This rock, with a depth of less than 6 feet, and which seldom breaks, is situated 3¾ miles 215° from Western Rock.

**Western Rock** is an islet situated about 9 miles northwest of Cape Montague, the southwest extreme of Esmeralda Island. At 3½ miles north of this rock there is a reef on which the sea breaks heavily.

**Port Nimrod,** situated 4 or 5 miles to the northward of Break Off Point, is said to afford two anchorages. The outer anchorage is between the islets lying off the point charted near this position; and the inner one, which is completely sheltered from the sea, is to the southeastward of the point. The entrance is from the southward, between the easternmost islet and the coast.

**Dundee Rock.**—At 5 miles west of Cape Dyer, the northwest extreme of Campaña Islands, is an islet named Dundee Rocks, which is a good object for recognizing Port Barbara, and bears from its entrance 244° distant 8½ miles. At one mile northward of the rock there are 24 fathoms, and the depth gradually decreases on approaching the port.

A rock on which the sea always breaks lies about midway between Dundee Rock and Cape Dyer.

**Port Barbara** is south of Breaksea Island, by which it is sheltered. Between it and the anchorage ground are depths of 3½ to 4¾ fathoms. It is only adapted to small vessels.

Anchorage is found both in Sand Bay and Mud Bay, but the outer part of Sand Bay is occupied by a sandy and shallow flat, so that

only very small vessels can get far enough in to obtain shelter from the swell.

Mud Bay, the eastern of the two, has 21 feet of water at the entrance, but 400 yards farther south has anchorage in 15 fathoms, mud.

**Tides.**—High water, full and change, at Port Barbara is at 28m.; springs rise 6 feet.

**Directions.**—Standing in for this port from the southwestward, when Cape Dyer bears 200° distant 3 miles, the vessel will be close to some rocks, which must be left on the port hand. The depth will be 11 fathoms when passing them at a distance of $\frac{1}{8}$ mile. Here the channel is 1 mile wide, gradually narrowing as Breaksea Island is neared, until at Wreck Point, round which the port opens, the breadth is not much more than 200 yards. There are several rocks in this passage, but the anchor may be dropped and the vessel warped clear of them in case of being becalmed.

**Flinn Sound,** a deep opening 2½ miles eastward of Port Barbara, trends 4½ miles in a southerly direction.

**Cape Bynoe,** with the breakers and islands extending 5 miles from it, forms the western head of Fallos Channel. There is a clear passage between the cape and the Bynoe Islands, bounded on either hand by rocks and breakers; but foul ground extends for 3 miles to the northwestward of the islands.

**Southwest Pass.**—The Guaianeco Islands are separated from Wellington Islands by Southwest Pass, which at its southwest end is obstructed by rocks, and at the south extreme of Byron Island it is scarcely 1 mile wide. The north point of Wellington Islands is Cape San Roman, round which Messier Channel trends away to the southeastward.

**Gulf of Peñas,** between Guaianeco Islands and Peninsula of Tres Montes, is about 42 miles across, and, from a line joining the two, extends eastward the same distance. There are many inlets and sounds in the gulf, but a large portion of its shores are unsurveyed. The Patagonian Channels open into the southern part of the gulf.

**Boca de Canales,** on the eastern shore of the Gulf of Peñas, as well as all this part of the coast, is from Machado's account. It runs in a southeasterly direction for 11 miles and then divides into two arms, one turning to the eastward for 15 miles and the other 11 miles to the southward, where they terminate. They are merely deep and narrow arms of the sea, running between steep-sided ranges of mountains. The shores are rocky, affording neither coves nor bights, not even shelter for a boat, and are entirely unproductive.

Two miles off Cape Machado there are two rocks which the pilot carefully and correctly describes, as he also does the rocks and

breakers that extend from the south head for nearly 3 miles. The *Beagle* twice occupied an anchorage under the Hazard Islands and on both occasions was detained many days by bad weather.

Excepting this very bad and exposed anchorage, there is no other in this channel, and Capt. Stokes, commanding the *Beagle*, describes it as being extremely perilous: "The anchors were in 23 fathoms, on a bad bottom, sand and coral. The squalls were terrifically violent. Astern, at the distance of 100 yards, were low rocks and islets, upon which a furious surf raged, and on which the ship must have been inevitably driven if the anchors, of which three were down, had started."

**Jesuit Sound.**—Between the Boca de Canales and Jesuit Sound the coast is more unbroken, and lower than usual. In latitude 47° 17′ S. lie some reefs, which project 2 miles to seaward; but behind them there was an appearance of a bight which might, perhaps, afford anchorage. Jesuit Sound is unfit to be entered by any ship. In its entrance a large island makes the passage on either side very narrow, both passages being rendered still narrower by rocks and islets. It terminates in two inlets, Benito and Julian. The former is bounded on either side by high mountains and terminates in low land, with a rivulet that originates in a large glacier; the latter ends in high mountainous land, with streams of water between the hills; one part of it is cliffy, and it has on the southwest side a long sandy beach.

**Xavier Island,** which is separated by Cheape Channel from the main and the entrance to Jesuit Sound, is 11 miles long, in a northeasterly and southwesterly direction, 4 miles wide, high, and thickly wooded with lofty trees.

**Anchorages.**—The only two anchorages which it affords are on the eastern side. They are noticed and named by Machado, the northern one Port Xavier, the southern Ignacio Bay. Port Xavier is by far the better place, being secure from the prevailing winds, with 17 fathoms at 800 yards from the shore. The south end of the port is a sandy beach, backed by tall beech trees. The shore to the south of the port, for the first 4 or 5 miles, consists of a high, steep, clay cliff, with a narrow, stony beach at its base, rising into mountains of 1,200 to 1,400 feet high, which are covered by large and straight-stemmed trees. The remainder of the coast to Ignacio Bay is low and slightly wooded with stunted trees, and its whole extent is lashed with a furious surf that totally prevents boats from landing. Ignacio Bay affords anchorage in 9 fathoms. The western coast of the island is lined by reefs extending 2 miles off, upon which the sea breaks high.

**Kelly Harbor,** in the northeastern corner of the Gulf of Peñas, between Cheape Channel and San Estevan Gulf, takes an easterly

direction for 8 miles, and the land about it is high, rugged, and rocky, a peak on the south side being 1,540 feet high, but by no means destitute of verdure. The interior shows many lofty peaked and craggy ranges of snow-covered mountains. The points of entrance are 2 miles apart, and are thickly wooded and low compared with the adjacent land. Between them the channel is from 35 to 40 fathoms deep, over a mud bottom, and to within 200 yards of the rocky islets that fringe the shore for the breadth of ¼ mile.

On approaching the harbor the very muddy appearance of the water is somewhat startling. This discoloration is due to the streams produced from an extensive glacier that stretches many miles inland.

For standing in the course is 133° until on the line between the inner north point and the islet off the south shore fronted by several wooded islets, then haul up along the north shore, keeping it close aboard, and anchor in 20 fathoms with the two points of entrance shut in with each other, and when within 300 yards of the sand spit which extends off the western end of a high and thickly wooded island.

The holding ground is excellent. Shelter, wood, and water are the only advantages offered by the harbor. Environed by lofty mountains and ice-filled valleys and ravines, it is chill, damp, and dreary. A few birds and a small number of hair seals were the only living animals seen by the *Beagle*.

The glacier is a good leading mark for this harbor, being a large mass of ice lying on the low ground to the northward. When in the fairway of the port the Sugarloaf in Holloway Sound will be seen in line with the extremity of the land to the northward of Purcell Island bearing nearly 290°.

**San Estevan Gulf.**—The entrance to this gulf is 10 miles northward of the northeast extreme of Xavier Island, between Cirujano Peninsula and a long, sandy beach on which a furious surf breaks, curving round to the northwestward toward the entrance of San Tadeo River. Dead Tree Islet lies in the center of the entrance.

**Anchorage.**—The gulf is one of the best harbors on the coast, being easy of access and with moderate depths of water, good holding ground, and a clean bottom.

**Cirujano Peninsula** is connected with Forelius Peninsula by an isthmus covered with small trees. On the northern side of the isthmus is a shallow bay of no service to ships. The missionary priests describe a port on the peninsula called San Tomas.

**San Quentin Bay.**—San Estevan Gulf divides into two branches—San Quentin Bay, which extends for 10 miles westward between the main and Forelius Peninsula, and Aldunate Inlet, which runs in 8 miles to the west-northwestward. San Quentin Bay terminates in continuous lowland, with patches of sandy beach, over which, among other lofty mountains, one named the Dome of St. Paul is

seen. The shores are thickly wooded with shapely and well-grown trees; the land near the beach, for the most part, is low, but rises into mountainous peaks, some of which, in the interior, are 1,500 feet high, but not craggy.

**San Quentin Shoal.**—In the central part of San Quentin Bay, approximately midway between and in line with Covadonga and Esmeralda Islands, is a large shoal 1¾ miles long in a northwest and southeast direction and ¾ mile wide, with 10 to 11 feet least depth of water over it, and consisting of sand, gravel, and shells.

About ½ mile to the eastward of the southeastern extremity of San Quentin Shoal, soundings of 21 feet, rocky bottom, were found.

At ¾ mile eastward of the eastern point of Cirujano Peninsula and southward of Cochrane Point is a shoal called Lantil Shoal, with 6½ feet of water over it and stony bottom. There is nothing to indicate the existence of this shoal except at low water in heavy weather, when the sea breaks.

Vessels entering San Quentin Bay should not steer too far to the northward, as the 5-fathom curve extends east and west at 1½ miles north of Arbolada Island, and to within less than 1 mile south of Point Bynon, when it turns to the northeastward; the channel into Aldunate Inlet being thus contracted to ¾ mile in width off the eastern end of Esmeralda Peninsula.

**San Tadeo River.**—The mouth of this river is easily distinguished, on entering San Estevan Gulf, by the sand hills on each side of its entrance and by the eastern trend of Cirujano Peninsula, bearing 220°. A sandy beach extends east and west of it for many miles, the land being low and marshy and covered with stumps of dead trees. The river has a bar entrance, but north of Point Ister (Marga) the bar has been washed out by floods so that it may be crossed by small vessels. A heavy swell breaks upon it for its whole length, and except in very fine weather, it is extremely hazardous to cross. At the mouth the breadth is not more than ¼ mile, but within the entrance it opens to a basin of some extent, and at 3 miles up it is 300 yards wide, after which it gradually narrows.

About 7 miles within the entrance the stream is divided into two arms; the northern arm, or Black River, takes a northerly and the other an easterly direction. The former is a strong and rapid stream, quite uninfluenced by the tide, which, however, is found for a short distance up the eastern arm, but beyond that the current down becomes generally as strong as in Black River. Its banks are comparatively barren to those of Black River, where the wood is very thick. The courses of both arms are very tortuous, and the bed of the river was so choked with trunks and branches of trees as to prevent its proper exploration, or the discovery of the Desecho, the

place where the Indians carry their canoes across the isthmus of Ofqui.

With reference to a supposed passage through from San Estevan Gulf to Chonos Sea, the result of a Chilean expedition entirely disproves its existence.

**Forelius Peninsula** is a strip of land 10 miles long by 3 miles wide, forming the southern shore of San Quentin Bay. It terminates in an isthmus of low, sandy land scarcely a mile wide.

**Purcell Islands** consists of one large and five small islands. The large island is moderately high, thickly wooded, and about 6 miles in circuit. These islands are separated from the southwestern part of Forelius Peninsula by a good channel, 2 miles wide.

**Turtle Rock,** only a few feet above water, lies about mid-channel, and nearly abreast the middle of the largest Purcell Island.

**Bad Bay,** 8 miles northwest of Purcell Islands, is open to the southwestward and to a heavy rolling sea. In clear weather Cape Tres Montes can be seen from the mouth of this bay.

**Tres Montes Gulf,** westward of Bad Bay, is 16 miles by 12, and contains the Marine Islands, one of which, the Sugarloaf, a mountain 1,840 feet high, is very conspicuous. Upon the main, about 6 miles north from the Sugarloaf, is another equally remarkable mountain, 2,284 feet high, which was named by Byron the Dome of St. Paul.

At the northwest part of the gulf is Hoppner Sound, about 5 miles across, and a deep inlet penetrates 7 miles to the southwestward, reaching to within 2 miles of the exterior coast, from which it is separated by an isthmus of low and thickly wooded land. The Marine Islands leave but little room for entering the sound, but the southern channel, though narrow, has plenty of water. On the southwest side of Marine Islands is Holloway Sound, leading to Port Barroso, an inlet extending 5 miles inland in a southwest direction.

**Port Slight.**—This sheltered port is situated at the head of the inlet at the head of Hoppner Sound.

The approach through Holloway Sound is free from dangers, and anchorage is found in a depth of 11 fathoms, sandy bottom, at ½ mile from the head.

There is a small pier and settlement on the western side, near which good supplies of wood and water can be obtained.

**Rock.**—A rock, which uncovers, is situated about 1 mile within the narrow entrance to the inlet leading to Port Slight.

Vessels should pass eastward of this rock.

**Neuman Inlet,** at the northeast part of Tres Montes Gulf, extends 17 miles inland, where it terminates, being separated from

Puelma Inlet by an isthmus about 1 mile wide. It is unserviceable, as the water is too deep for anchorage.

**Port Barroso**, formerly Port Otway, is on the south side of Holloway Sound, about 15 miles northeastward of Cape Tres Montes, and its entrance may be readily known by its being the first opening after passing Cape Stokes, which forms the eastern extremity of the Peninsula of Tres Montes. Off the mouth are the Entrance Isles, the easternmost of which is Logan Rock, 38 feet high, resembling the celebrated rock near the Lands End in England, the name of which it bears. It is broad and flat at the top, decreasing to its base, which is very small, and connected to the rock upon which it seems to rest.

Immediately within the entrance of Port Barroso on the western shore there is a sandy beach, over which a rivulet discharges itself into the bay, and just off that beach anchorage may be had in 9 or 10 fathoms, the most convenient berth that the port affords, well sheltered, but with a stony bottom.

It is reported, 1884, that there is shoaler water than formerly in the above-mentioned bay, soundings of 3 fathoms having been obtained by the *Kingfisher*.

Nearly 2 miles within the entrance the port opens into a large but deep inlet, with two arms extending southwest and southeast 3½ and 2 miles, respectively. Block Island lies in the mouth, with a small islet northwest of it, leaving three narrow passages, the best being that between the islet and the northern shore of the harbor, keeping nearer to the latter; the middle passage is very narrow, and the eastern one is shoal. This inlet contains anchorage all over it, but the depth is generally inconveniently great, being from 20 to 30 fathoms and, owing to the narrowness of the entrances, is only available for small vessels.

There also seemed to be an anchorage in a small bay outside, and south of the harbor.

There are about 80 inhabitants at Port Barroso, occupied in felling timber and fishing.

**Supplies.**—A large house stands on the beach abreast the anchorage, where shipwrecked persons could obtain shelter and assistance.

Wood and water are plentiful, also shellfish, and a species of bream. Wild celery can be obtained

As a place of refuge, or for any maritime purpose not requiring very dry weather, few ports on any uninhabited coast can be better adapted than Port Barroso, it situation making it very valuable for vessels bound either way.

Of this harbor Lieut. Commander Tanner, United States Navy, says: "Port Otway (Barroso) is by far the best harbor for all classes of vessels that we found in the straits or western Patagonian chan-

nels, and the facilities for obtaining wood and water are unsurpassed."

**Directions.**—In this latitude, where changes are so sudden, it will frequently happen that a vessel quitting Messier Channel in the morning finds herself caught in a westerly gale, or with a very threatening night coming on before she can clear the Gulf of Peñas. In this case Port Barroso is a safe harbor, which may be made in the heaviest weather without fear, the shores of the mainland as well as of the islands being steep-to.

Vessels bound to the southward in the thick tempestuous weather, which is the normal state in these regions, may reach this port when it would be very imprudent to run for the lee shore on the south side of the gulf. Under these circumstances the vessel should try and make the land about Cape Tres Montes, and after sighting it follow the coast round to the first opening which presents itself; but in doing this do not pass too closely to Cape Stokes and the next point to the southward of it, as there are some rocks off them.

The rock off the cape next west of Cape Stokes is about 60 feet high, and the outer rock, which lies about ½ mile northeastward of Cape Stokes, is rugged and of a dark color.

Cape Stokes should not be approached very closely in thick weather, as the outer rocks off it are low; the cape is about 500 to 600 feet high.

**Tides.**—High water, full and change, at Port Barroso is at 11h. 37m.; springs rise 6 feet.

**Cape Stokes Anchorage** is about 1½ miles to the northward of Cape Stokes, and during westerly winds good anchorage may be obtained in about 12 fathoms, with the outer rock bearing 184°, and a gully next north of Cape Stokes 327°.

**Cape Tres Montes** is the southern extremity of a peninsula of the same name. It is a bold and remarkable headland, rising from the sea to the height of 1,500 feet, with no apparent dangers beyond a distance of 400 yards from the shore.

Off the point between Cape Tres Montes and Cape Stokes there is a singular, high rock, which when seen from the southeastward looks like a brigantine under sail.

The tops of the hills in the vicinity of Cape Tres Montes are often hidden by clouds or thick squalls, when the lower land can be seen from a distance of 2 miles or more.

The Peninsula of Tres Montes is separated from that of Taitao by a remarkable cut, which is a good landmark when the summits of the hills are obscured.

**Easterly current.**—Instances have occurred of ships being placed in great danger from a strong easterly current in the neighborhood

of Cape Tres Montes; great vigilance must therefore be exercised when making this landfall.

From Cape Tres Montes to Chiloe mariners should also be on their guard against a strong set toward the land, which frequently occurs.

**Cape Raper.**—Cape Elena is about 6½ miles northwest of Cape Tres Montes, and Cape Raper, about the same distance north-northwest of Cape Elena, is higher than Cape Tres Montes. The side toward the sea is barren and ends almost perpendicularly. The three sand beaches between these two capes can not be approached, owing to the constant heavy swell and breakers. The rock lying 1½ miles to the northward of the cape is light gray and stands out well from the dark background of the mainland. On the reef lying 1 mile to the westward of the rock the sea has been seen to break.

**Light.**—A flashing white light is exhibited on Cape Raper, elevated 197 feet above the sea, and visible 20 miles over an arc of 204°, from 331° to 175°. (For details, see Light List.)

**Cape Gallegos,** 15 miles northward of Cape Raper, is a bold promontory, barren to seaward, and rising abruptly from the water; at 1½ miles south of it is Rees Islet, of the form of an earthen pot or stewpan and pierced with a conspicuous tunnel, making it a useful mark for recognizing the cape from the south. The rocks which surround the islet and the cape are all visible; the coast may be approached to a distance of ½ mile.

**San Andres Bay.**—Eastward of Cape Gallegos is San Andres Bay, containing no good place for large ships, but it has secure anchorage for small vessels in Christmas Cove, which is not ½ mile across, but is sheltered from all winds except those from the northward. Though apparently much exposed to this quarter, the danger from such winds is more apparent than real, as they do not become very strong till they are some points to the westward of north, and much sea would not be raised until then.

Between Christmas Cove and Cone Inlet, at 2 miles farther east, sealers report a perfectly sheltered anchorage in 4¾ fathoms, suitable for vessels of less than 300 tons, opposite the islands fronting Cone Inlet.

**Cone Inlet** extends in a southeasterly direction about 3 miles to the foot of a remarkable cone 1,300 feet high. It is quite sheltered and not a bad stopping place for a steamer inside the islet in its entrance with her stern secured to the shore, but there is no room to swing; for a sailing vessel it is so narrow as to be difficult of access and still more difficult to quit. Even with a northwest wind no swell penetrates the interior of the inlet, and there is a natural dock at the inner part on the northeast side. On the northern side of San Andres Bay, at the head of a deep bight, there is a large basin named Useless Cove, being unfit for any kind of craft.

**Pringle Point,** at 5 miles north-northeast from Cape Gallegos, forms the north side of San Andres Bay, and between it and Rescue Point, 18 miles to the northeast, the land is considerably lower. There may be anchorage in Stewart Bay, at 6 miles east-northeast of Pringle Point, but it was not examined.

**Cliff Cove,** locally known as Barranco Cove, forms an excellent port, capable of sheltering a large number of vessels in 4¾ to 20 fathoms, mud bottom.

Off the southern entrance point is a small islet, with rocks upon which the sea always breaks, extending 200 yards from it.

**Port San Estevan,** 20 miles northeast from Pringle Point, has very good anchorage in 10 fathoms water under Rescue Point. Fresh water may be easily obtained in the stream at the head of the inlet, or from runs near the anchorage. Dark Hill, 2,150 feet above the sea, at about 5 miles east of Rescue Point, is a good object for recognizing this port. There is no hidden danger, provided the rocks at the point have a berth of 200 yards given them. A vessel should anchor close to the west shore, under shelter of the reef off Rescue Point.

**Cat Cove,** about 2 miles east of Port San Estevan, is said to form a good harbor. Entering this cove, pass south of all the islands at the entrance.

**Usborne Islands.**—This group consists of four principal islands and other smaller ones, situated in the entrance of Cornish Inlet, 8 miles from Port San Estevan. In their vicinity are the following dangers: At ½ mile to the west of the western island, some rocks which uncover and break occasionally; from the southeast islet extends toward the little peninsula of the main coast a submerged rock and three smaller islets. There is no passage between them, and the submerged rock breaks only with a sea from the south.

Well protected anchorage, in 5 and 6 fathoms, sand bottom, may be had in the middle of the three easternmost islands of the group, entering from the northeast.

**Cornish Inlet,** entered to the southward of Duende Peninsula, affords two fairly sheltered anchorages. One, off the Usborne group, as mentioned above; the other is at the head of the inlet, near Duende Peninsula and the isthmus which joins it to the mainland. There is a depth of 13 fathoms in the latter anchorage and it is sheltered from westerly winds.

**Anchorage.**—A large vessel can anchor in the northeastern part of the bay formed by a peninsula extending from the mainland at about 4 miles northeastward of Mount Alexander.

This anchorage is approached by passing midway between Usborne Islands and the island northwestward of Mount Alexander; the holding ground is good, but the bay is open to the southwestward.

There is no passage among the islands eastward of Usborne Islands.

**Auxilio Arm.**—From the eastern shore of Cornish Inlet four arms extend, the most important of which is Auxilio Arm, opening abreast of the south end of Duende Peninsula and extending to the southeastward for 5 miles, when it divides into two branches; one, broad, trending to the southward; the other, narrow, running to the eastward and terminating after 2 or 3 miles in a small river 2 miles long flowing out of a small lake, which, in turn, communicates with a lake eastward of it by another small river running through a valley easy to traverse.

**Shipwrecked persons** in boats, instead of going by sea along this dangerous coast in search of help, should make for Auxilio Arm, from whence they can reach, partly by water and partly by portage, the Puelma Inlet which leads into Moraleda Channel.

Assistance can be obtained in Aysen Inlet, which is inhabited, or at Port Tangbac, which is much frequented by fishermen, or at Port Melinka at the north end of Moraleda Channel.

**Hellyer Rocks** are a cluster of outlying dangers scarcely above water, on which the sea breaks, lying almost north of Rescue Point and 6 miles from the nearest land, Duende Peninsula.

**Cape Taitao** is 25 miles north of Port San Estevan, the intervening coast being broken and rugged. The cape is one of the most remarkable promontories on this coast; it makes like a large island, pointed at the summit; is nearly 3,000 feet high, rugged, barren, and steep, and has several rocks above water around it; none, however, more than 1 mile offshore.

**Anna Pink Bay.**—This extensive bay, named for the British naval supply ship *Anna Pink*, which took refuge here in 1741, is comprised between the Taitao Peninsula and Tenquehuen, Clemente, and Guerrero Islands. It contains a number of small islands and rocks; at the head of the bay are Serrano and Wickham Inlets and Williams Channel.

Inchemo Island, 450 feet high, has an anchorage on the east side, protected against winds from the westward; vessels of any size can anchor here in 14 to 20 fathoms on the following bearings: Penguin Island, 19°; summit of Inchemo Island, 245°. Smaller vessels may anchor closer to the island in 10 fathoms.

At 1¼ miles, 105° from Penguin Island is a submerged rock, called Gallardo, on which the sea sometimes breaks.

**Reef.**—A reef, on which the sea breaks at low water, extends for a mile to the west-southwestward of Mitre and Patch Islets, which lie 5½ miles to the eastward of Inchemo.

**Port Refuge**, in the southeastern part of Anna Pink Bay, is easy to make, clear of danger, and affords well sheltered anchorage. The

best anchorage is in the bay eastward of the point which forms the eastern side of Cañaveral Cove, but vessels may also lie in Labata Cove, at the head of the port.

**Cañaveral Cove,** on the south side of entrance to Port Refuge, though small, is very convenient for refitting or for executing any repairs to small vessels.

**Patch Cove,** to the southwest of Cañaveral Cove, is small and unfit for vessels exceeding 200 tons.

**Tenquehuen and Menchuan Islands** form the northern limit of Anna Pink Bay. On the northeast coast of the former, in the entrance of an inlet which opens to the east and in the shelter of a number of islets, is a good anchorage in 9 fathoms, sand. In the middle of the two islands named is another anchorage, with abundance of water, wood, fish, and wild vegetables. The western extremity of Menchuan Island is low and should be given a wide berth on account of offlying rocks.

# CHAPTER IX.

## CHONOS ARCHIPELAGO AND GUAITECAS ISLANDS.

**General remarks.**—Chonos Archipelago, with the Guaitecas Islands, occupies an area of over 130 miles in latitude, from Anna Pink Bay and Pulluche Channel northward to Corcovado Gulf. It consists of a multitude of islands of various sizes, of which those nearest the ocean, having all the force of the wind, are generally bare and rugged, while those of the interior are covered with a luxurious thicket extending from the water's edge to the crests of the peaks, some of which are more than 5,000 feet high.

Besides the large Moraleda Channel, which runs from north to south on the eastern side of the archipelago, separating it from the mainland, there are a large number of transverse channels of various widths in which the water is generally deep. The principal channels are the Pulluche, with its prolongation of Chacabuco; Darwin, situated 25 miles to the northward, and especially recommended for large vessels; Ninualac, 20 miles north of Darwin; and Tuamapu, which borders the Guaitecas Islands on the south. All of the above-named lead from the ocean to Moraleda Channel, and any one of them may be used, always observing the greatest vigilance, for, although these channels are the most traveled and best known, it is well to bear in mind that they are as yet but incompletely surveyed and may contain many dangers not shown on the charts.

It may be said generally that banks of sand or mud are unknown in the archipelago, the dangers which the navigator is liable to encounter being patches of rock, either submerged or awash. These are usually marked by kelp, but as this is carried under by the tidal currents, it is advisable to proceed only at slack water, or to keep a good lookout from aloft.

**Tides.**—In the channels which have an east and west direction the flood sets to the eastward and ebb to the westward. In those having a north and south direction the flood generally sets to the northward and ebb to the southward. The rate of the streams is generally from 2 to 3 knots an hour, and this is exceeded only in exceptionally narrow channels. The amplitude of the tides does not reach 10 feet in any part.

**Climate.**—The climate is severe, especially in the winter; the changes in the temperature are very abrupt; showers mixed with hail, accompanied by furious squalls, occur frequently, as do also heavy snowstorms, which render the navigation of the narrow channels dangerous. Earthquakes are rare. In the summer there are some beautiful days, and the sun even dries up the brooks, causing a want of fresh water; but this is rare.

It is estimated that from 156 to 192 inches of rain fall annually. On an average day it is rare to see the horizon farther than 5 miles, the atmosphere is so thick and saturated. The climate is not unhealthy; local diseases are rare and epidemics unknown.

**Winds.**—During the summer and spring the winds from the northeast and the southeast quadrants are very rare, the winds generally blowing from the north-northwest, west-southwest, and south. The winds generally die out during the evening, especially those from the north and south; the winds from the southwest, on the contrary, freshen, or at least keep their force, in the evening. The shifts to the southwest generally take place about sunset. During the morning the northwest winds predominate. Generally speaking, the winds from the north-northwest, west-southwest, and south are about equally divided. Calms are also as common during the morning and at noon as any of these winds; during the evening they are about twice as frequent; in other words, the calms occur one day out of six in the forenoon, one day out of seven during the day, and one day out of three during the evening.

The northwest and the southwest winds deposit all the evaporation of the Pacific Ocean on the cordillera, which causes the frequent rains. In the estuaries, as that of the Rio Aysen, it rains less, though 11 inches has fallen there during one night. The calms and the northeast or northwest winds bring the heaviest rains. There are only passing showers with the west or southwest winds, but it invariably rains in torrents during southeast winds.

Vessels at anchor must keep a good lookout for the shifts from northwest to southwest.

Sometimes the wind after shifting suddenly from northwest to west returns to northwest, as it does more to the northward, when it blows with more violence than before; in fact, there are two gales following close to each other.

During the winter the gales are accompanied by thunderstorms, and the traces of the passage of the lightning are frequent on the declivities of the mountains.

**Population.**—In the Chonos Archipelago there are no wild Indians, and the floating population, all proceeding from Chiloe, may be estimated at 600. The only port with an established population, and in which shipwrecked persons can find refuge, is Melinca, in the Guaitecas Islands.

**Communications.**—The Moraleda Channel extends from Traiguen Island to Corcovado Gulf; to the southward of Traiguen extend channels named Costa, Elefantes, Errazuriz, and Barrio, and Puelma Inlet, which reach to Elefantes Gulf and San Rafael Lagoon and to within a short distance of Newman and Cornish Inlets.

These channels make the interior of the peninsula accessible to the vessels occupied in the lumbering and fishing industries, and these are cruising constantly in the archipelago, carrying laborers and products. The masters of these vessels are generally sufficiently familiar with the navigation of this region to act as pilots of large vessels, when their services are required by the latter, but they should be depended upon only for pointing out the direction of the channels.

The steamers of the Braun & Blanchard Line plying between Punta Arenas and Valparaiso by way of the Moraleda and Darwin Channels stop at Melinca; also the steamers of the Compañia Sud-Americana de Vapores. Communication with Chiloe is continuous and regular.

**Wickham Inlet** opens to the east of the Catalina Group and forms the entrance of the Pulluche Channel. It is broad and clear and its navigation presents no difficulties once the islands of the group referred to are recognized and passed.

As soon as a vessel coming from seaward arrives south of Inchemo Island, half way between it and Lobos (Seal) Point, head for Direction Island, approximately 89°, until the islets Mitre and Patch bear on the port quarter, distant ½ mile. At this point change course to 72° and steer for Centro Islet, standing on until Redonda Islet bears on the starboard quarter, when head for Guerrero Island, keeping the south point of the latter slightly open on the same side by hugging the shore of Entrada Island as close as prudence allows. Having cleared this, change course as necessary to make the entrance of Pulluche Channel between Guerrero and Ricardo Islands.

In the north coast of Wickham Islet, Williams Channel opens, leading eastward of Clemente and Garrido Islands to Darwin Channel; in the south coast open the inlets Serrana, Goni (with a rock in the middle of the entrance, awash at low water), and Walker. These are without special interest to navigators.

**Pulluche Channel.**—This is a somewhat tortuous channel, 15 miles long in a general east-northeasterly direction. Its breadth is nowhere less than 600 yards, nor more than 1¼ miles; its depth is much greater in the western part than in the eastern, the division being at Bajo Point, which is the extremity of Salas Island opposite the entrance of Balladares Inlet. From this point, a submerged rocky patch extends toward the west, over which is a depth of only 6 fathoms in mid-channel. Westward of this patch the depths grad-

ually increase as far as the end of the channel, but nowhere do they exceed 28 fathoms, a circumstance which would permit of anchoring anywhere, in case of necessity, particularly in the Balladares Inlet. At the northwest point of Salas Island a shoal marked by kelp extends 200 yards from shore; otherwise the channel contains no known hidden dangers.

**Balladares Inlet** affords very good anchorage in 8 to 11 fathoms, mud, halfway between Copihue and Laurel Points, although vessels may anchor farther inside. The above anchorage is preferable on account of the good shelter afforded during westerly winds. Near the south shore of the entrance is a rock which uncovers at low water.

**Ling Inlet,** 3 miles northeast of Balladares, is open, deep, and unsheltered, which defects do not recommend it as an anchorage.

**Abandonados Channel,** narrow, tortuous, and navigable only by small vessels, runs south of Prieto Island and connects Pulluche and Alexander Channels.

**Alexander Channel,** the continuation of Abandonados, is equally narrow and tortuous; it leads south of Salas Island, and at its eastern end connects with Utarupa Channel, which extends south-southeastward, is 20 miles long by 6 miles wide, and connects Pulluche and Chacabuco Channels with Darwin Channel.

**Matilde Island,** lying in the northern part of Utarupa Channel, divides it into two parts whose hydrographic features are radically dissimilar. The western passage, or that lying between Matilde and Rivero Islands, is little more than 1 mile wide, and clear, without any known dangers, while the eastern passage is more than 3 miles wide, foul, and the bottom is very uneven. This condition prevails on each side of the channel south of Matilde Island and it is recommended always to keep close to the shore of Rivero Island and proceed with great caution, as this region is not well surveyed.

**Utarupa Channel** is very favorable to those vessels which, proceeding from Moraleda Channel, find it impracticable to proceed to sea by Darwin Bay. Following Utarupa Channel these vessels take, in order, the Utarupa and Pulluche Channels, and if they encounter rough or threatening weather outside, they can take shelter in Anna Pink Bay.

**Port Condell** is situated on the east coast of Rivero Island, opposite the southern part of Matilde Island. It is 1 mile broad by ½ mile long and affords sufficient space for two or three vessels of medium size. It is well protected against winds from south to west and in less degree against those between west and north. There is a good anchorage in 8 to 10 fathoms, sand and shells, close southward of an islet on which some trees stand, situated in the center of the bay and forming a good landmark; this island is connected with the

northwest shore by a shoal of sand and stones on which is a depth of less than 2 fathoms. On the south shore is a conspicuous cascade, where vessels may water.

**Duble Channels.**—These channels have been but very incompletely examined. The first opens 1 mile north of Port Condell, in the coast of Rivero Island and extends in a southwesterly direction for 5 or 6 miles. The second opens about 2 miles north of the entrance of the first, and extends in an approximately parallel direction; it appears to unite with Williams Channel about 8 miles south of Port Yates. A short transverse channel connects the North and South Duble Channels; the depth in this does not exceed 9 fathoms, and two islets in its southern entrance considerably reduce its width, while the Duble Channels are generally clear, with depths of about 25 fathoms.

**Chacabuco Channel** starts from the south part of Utarupa Channel and extends toward the east, southward of Humos and Traiguen Islands, as far as Elefantes and Costa Channels. The first part of this channel extending between Utarupa and Errazuriz Channels, offers no difficulty to navigation, provided a mid-channel course be maintained, inasmuch as the rocks in it are all visible or else lie near the north shore; but in the second part, from Errazuriz to Costa Channel, there are islets and rocks awash which make it necessary to proceed with great caution.

**Harchy Bay** is situated at the southeast extremity of Humos Island, near the junction of Chacabuco and Errazuriz Channels, and is not recommended; it is exposed to winds between south and west which blow lengthwise of Chacabuco Channel; but a line of shoals, of which Observatory Cay forms part, protects it from the southeast swell when the wind blows from that quarter. The best anchorage is in the western part of the bay, in 10 to 11 fathoms, near the shore.

Wood and water in abundance may be easily obtained.

It is high water, full and change, at 1h. 30m.; tides rise 9¾ feet.

**Port San Miguel** lies in the southeastern part of Rojas Island and affords well-protected anchorage in 17 to 20 fathoms, sand, but it is large enough for large vessels only when moored.

A vessel making for Port San Miguel from Costa Channel should go around by the east of Raimapu Island, and south of Figueroa Island which, with Traiguen and Rojas Islands, form the extensive San Ramon Bay, which affords good anchorage in all parts, but particularly in Port San Miguel.

**Darwin Bay** lies just north of Anna Pink Bay, from which it is separated by Tenquehuen and Menchuan Islands, and various islets. Garrido Island forms its eastern side, and at the north are the Valle-

nar Group and Isquiliac Island, between which and Garrido Island, Darwin Channel opens.

In the center of the bay is Analao Islet, 130 feet high and flat on top; it is a good landmark.

**Vallenar Road** lies eastward of the islands of the same name and is recognized by Mount Isquiliac, 3,200 feet high and very rugged, with the summit divided into three sharp points. Excellent anchorage may be found here, easy of access and protected from the prevailing winds. The best anchorage is in 11 to 12¼ fathoms of water near and east-northeastward of the observation spot, a little islet situated near the southeast extremity of Three Fingers Island.

**Angamos Rock,** on which the Chilean transport of that name struck in 1890, is a flat, isolated rock, with less than 10 feet of water, and very dangerous, being directly in the course from the north. The kelp which grows on it is generally not visible except in calm weather.

**Darwin Channel** opens in the northern part of Darwin Bay and is considered the best of those which lead to Moraleda Channel, as its navigation is free of dangers and is easy even for vessels of the largest size. It offers good anchorages at both ends, Vallenar Road at the outer end and Port Lagunas in Moraleda Channel. Its entrance from the ocean can not be mistaken, as it is clear and well defined, without islets or rocks, between high lands, with the landmarks Analao Islet, Mount Isquiliac, and the Vallenar Islands. The channel is 3 miles wide between Points Isabel and Alfred, whence the channel extends in a 106° direction for about 7 miles, thence 60° for 6 miles, as far as Pajaros Islet, white, 10 feet high, which lies close to the track of vessels. From this point the channel continues in the same direction for 3 miles, where it turns toward the east around Palumbo and Quemada Islands, a distance of 15 miles, uniting finally with Moraleda Channel.

**Darwin Rock.**—Half way between Pajaros Islet and the southeast point of Italia Island, a little to the north of the middle of the channel, is Darwin Rock, a small pinnacle with 3¼ fathoms depth at low water springs, and with deep water surrounding it. The kelp growing on this rock is sometimes seen at slack water, but is not visible at other times.

Course may be laid to pass either side of this danger, but that to the north is recommended, as the water off Italia Island is deep and clear within a short distance of the shore. In this coast there is, moreover, a conspicuous white patch, from which Darwin Rock lies about 0.7 mile in a southeasterly direction.

**Tides.**—In Darwin Channel the flood current sets to the eastward and the ebb to the westward; the greatest velocity reached being about 3½ miles per hour, in the zone comprised between Point Quilan,

on Marcacci Island, and Negra Island, which is close to the coast of Quemada Island.

**Directions.**—To approach Darwin Channel, proceeding from north and west, first make Huamblin Island, taking care to allow for the currents, which set toward the north and east.

Approaching Darwin Bay there are good points of recognition in Paz and Liebre Islands, Lemu Island, smaller and lower than Isquiliac, and Analao Islet, which is flat on top and generally visible 15 to 20 miles, even when the weather is not altogether clear. The channel is well determined by a large entrance bay, the mountains which form it on each side being high and steep; and at most the approach presents no difficulties, especially if one knows his latitude.

When the vessel arrives between Isabel and Alfred Points, the entrance to Williams Channel, in which is Port Yates, will be seen at a distance in the south coast. Proceeding eastward the course runs close to the islands Isquiliac and Italia, leaving Pajaros Islet and Darwin Rock, mentioned above, to southward. Quillin Island, on whose eastern shore is Port Italiano, will be seen ahead.

When opposite Point Quilan change course to 123°, leaving Lamancura and Lobos Islets on the port hand; the bottom in the vicinity of these islets is rocky and uneven, and they should be avoided in passing. At 1½ miles farther eastward the channel narrows to 700 yards, but the water is deep and clear in mid-channel until coming into Moraleda Channel, but the south coast should not be approached, as kelp grows at a good distance offshore.

**Williams Channel—Port Yates.**—Williams Channel opens in the south coast of Darwin Channel, at 2½ miles east of Isabel Point, and extends southward to Anna Pink Bay. At 2¾ miles from the entrance is Port Yates, where a sandy point projects across the channel from the east coast to within 500 yards of the west coast. There is a depth of 6 fathoms in this passage, and the currents run from 2 to 3 miles an hour.

The anchorage is about 1,600 yards in diameter, the bottom is of sand and the depth varies from 6½ to 20 fathoms. The best bottom is toward the end of the sandy point near a spit on which is 3 fathoms of water. The best anchorage to avoid action of the currents is in 11 to 17 fathoms of water as near the coast as the draft of the vessel will permit.

It is high water, full and change, at 0h. 35m.; tides rise 10 feet.

Heavy squalls are frequent in this port, the most violent ones coming from a deep ravine off the southwest part.

Shellfish may be found along the shore; wood and water are abundant and easily procured.

**Port Italiano** is an anchorage situated 17 miles within Darwin Channel, between Quillin and Victoria Islands, the first of which,

about 132 feet high, protects the port from southwest winds. Heavy squalls are not felt at this anchorage.

The best anchorage is with the south point of Quillin Island bearing 225°, midway between the islands named; the depth is 17 to 22 fathoms, mud bottom. Good anchorage may also be found northward of this position.

East of the north extreme of Quillin Island is Pisagua Islet, south of which and over 200 yards distant is Caracol Rock, marked by kelp.

Between Ports Yates and Lagunas there is no other anchorage which may be described, though in case of necessity a vessel might anchor between Quemada and Mitahues Islands, being careful to avoid a shoal of 2 fathoms which lies 600 to 800 yards from the shore of Quemada and about 263° from the south point of Mitahues Island.

**Carrera del Cuchi.**—This name is given to the channel which separates from Darwin Channel just opposite Port Italiano and runs eastward, north of Palumbo and Quemada Islands, joining Moraleda Channel a little south of Port Lagunas. It is suitable only for very small vessels, as it contains many narrow places and a shallow passage which is almost dry at low water.

**Adventure Bay.**—This large bay lies immediately to the north of Darwin Bay and westward of a group of islands 45 miles long between Vallenar group and Ipun Island.

Near the center of the bay and about 20 miles offshore is Huamblin Island, an important point for recognizing and approaching the bay.

The islands which form the east shore of the bay are in general large and high. Lemu Island is a little lower than Isquiliac, which is 3,200 feet high; Sullivan Peak, on James Island, is 4,167 feet high; Williams and Stokes Islands are 2,400 and 2,720 feet high, respectively. In the center of the bay are Paz and Liebre Islands, remarkable for their conical form; the first is 1,160 feet high and forms a good mark of reference for a ship making for Ninualac Channel. Adventure Bay is lined with rocks and reefs, some of which extend a good distance from the coast, and there is no good anchorage in it. In the southeast shore is the opening into Ninualac Channel.

**Huamblin Island.**—This island is 9 miles long north and south by 5 miles wide, and is a little more than 715 feet in height. It is covered with abundant vegetation. The south coast between Bories and Edwards Points is shallow and uneven. In ordinary weather the sea breaks on the submerged reefs in about 4½ fathoms of water and with heavy seas from the southwestward breakers extend out to 10 fathoms.

Between Edwards and Arena Points the coast is low, and there is a heavy swell, but here is found Pinto Anchorage, where the conditions are better than in Rompientes Cove, on the opposite coast.

The east coast, from Arena Point to the north extreme of the island, is formed of cliffs of moderate height; Este Anchorage, on this coast, is favorable with southwest winds.

The north and west coasts are high, with rough seas breaking on them, and should not be approached closer than 1 mile; however, with exceptionally calm sea landing may be made in Lampazar Cove, situated ½ mile north of Searle Point.

**Bories Point** is high and steep, with several off-lying islands and rocks and should not be approached within ½ mile.

**Rompientes Cove** is situated 4 miles eastward of Bories Point, between points Herrera and Edwards, which should be rounded at the least distance of 1 mile. This cove is well protected against northerly winds, but westerly winds find their way into the anchorage. Vessels should anchor outside of a line between Points Herrera and Edwards in 14 fathoms of water; the bottom, of sand and rock, is very uneven. In the northwest part of the cove is a small natural basin where landing may be made and where water may be obtained. Wood of good quality is abundant, and shellfish may be found upon the beach.

**Pinto Anchorage** is situated on the east coast of the island between Points Edwards and Herrera in an east-southeasterly direction from the latter point. The anchor may be let go in 11 to 14 fathoms, sand bottom, where there is protection against southwest winds. Arena Point seems to be gradually extending, and care should be taken when approaching the anchorage.

**Eastern Anchorage** lies between points Arena and Piedras, the latter situated 3½ miles northeastward of the former. The bottom is of thin mud, and the shore should not be approached too closely when anchoring. This anchorage should not be used during northwest winds. With good weather landing may be made in any part of the bay between Arena and Baja Points, the best place being about 1 mile south of Piedras Point in a small cove with sandy beach.

**Piedras Point** is a foul and rocky projection, on the south side of which is a small bay accessible by boats; there is also a landing on the north side, as above mentioned.

**Baja Point** is the northeast extreme of Haumblin Island. The waters in this vicinity, as well as those off the coast to the northwestward, are shoal, and the shore should not be approached within 1 mile.

**North Point.**—This point, as well as all the north coast of the island, is cliffy. North Point is conical in form and on account of off-lying reefs should not be approached within 1 mile. About halfway between North Point and Searle Point is situated Lampazar Landing, which is used by the coast vessels in ordinary weather. It

may be easily recognized by the river, which empties into a small basin, and by several pillar-like rocks on the side of the entrance.

**Searle Point** is the western extreme of Haumblin Island. It is high and rugged with a cone-shaped summit; several rocks lie close to it. On account of the currents already mentioned, this coast is very dangerous, and numerous wrecks lie upon it. It is intended to establish a light on Searle Point.

**Narborough or Ipun Island.**—This island is situated 15 miles northeastward of Haumblin Island and resembles it in general aspect, being comparatively low, flat, and fertile, while the other islands of the region are generally high, rugged, and bare on the sides toward the sea.

Ipun Island may usually be approached, as the rocks and reefs which lie in the vicinity of the salient points are marked by breakers and may be avoided without difficulty, but north of the island are two important dangers which should be given careful attention. The first is Tacna Rock, which lies 5 miles, 34° from Cape Lort and is visible only during strong west winds, which form breakers over it about 200 yards in extent. The second is Duble Shoal, situated 8¾ miles, 350° from Cape Lort. As in the first case, breakers form here only with strong west winds. This shoal is about 1 mile long in a north and south direction, with surrounding depths of 17 fathoms.

**Scotchwell Bay** is an excellent anchorage in the southeast part of Narborough Island where wood and water may be obtained and repairs made. The anchorage should be approached by the northern passage, for although no hidden dangers are known to lie in the southern passage, it is narrow and may contain dangers uncharted. Just north of Scotchwell Bay is another anchorage, with depths of 11 to 17 fathoms over sand and clay bottom.

**Ninualac Channel** is another of the principal channels which lead into Moraleda Channel from the Pacific. The entrance is at the foot of Adventure Bay between James Island on the north and Kent and Melchor Islands on the south; its course is nearly straight and, being wide and deep, its navigation presents no great difficulties. Sullivan Peak, on James Island, 4,167 feet high, is usually visible from a great distance.

Several rocks, shoals, and reefs lie on each side of the seaward entrance but may be avoided without difficulty except in dark and foggy weather. Seven miles within the entrance, at the point where the channel turns, an island lies in midchannel, around which at 300 yards distance are depths of 50 fathoms, but close to the island the water is shoal, especially on the north side where there are depths of 2 and 3 fathoms; the northern passage is, however, much wider than the southern.

Four miles farther in and opposite a wide beach on the north coast is a rock which covers only in the highest tides. It is marked by kelp and vessels may pass safely on either side at 200 yards off, where there are depths of 12 fathoms.

At 6½ miles farther eastward and close to the south shore of the channel are two islets with submerged rocks surrounding them for a distance of 400 yards, but there is plenty of room toward the north shore. From this point the channel is clear as far as its junction with Moraleda Channel; there on the south shore are the islands known as Silachilu and Pajal, the first with several islets and rocks on its west side and the second with an islet and Westoff Rock, submerged, at more than 1 mile to the northeastward of it. Near the north shore of the channel is Blanco Group, formed by various rocks and islets.

The currents in Ninualac Channel attain a velocity of 3 to 4 miles an hour during spring tides.

**Port Concha** is a fairly good anchorage, situated at the entrance of Ninualac Channel on the coast of James Island. It is formed by a small indentation of the coast and an island opposite, which protects the port on the west. The island is separated from James Island by a narrow, shallow channel. A sandy beach which is seen in the head of the port extends some distance into the harbor, making the water shoal. The anchor may be let go in the shelter of the island in 8 fathoms of water.

**Port Maria Isabel** is situated in the east coast of Kent Island at less than 2 miles from the center of Ninualac Channel. The southern part is formed by a large island called Renan, which rises to the height of about 2,300 feet.

Across the entrance to the port, which is about one mile wide, lies Puren Island, forming two channels into the harbor; the northern channel being narrow and shoal is impracticable, while the southern, although only 400 yards wide, is deep and clear.

A good land mark for this port is a white patch a little above water on Manchon Point, the southern point of the entrance. This patch, in line with two similar patches near the crest of Mount Renan, forms a good range leading from Ninualac Channel. At about 400 yards from Manchon Point the course should be changed for the middle of the entrance channel.

Vessels may anchor in the center of the port in 28 fathoms of water, bottom of mud and sand; the anchorage is perfectly sheltered and large enough for 2 or 3 vessels at once. In the southwest angle of the bay, at 300 yards from the south and west shores, is a rock awash, without kelp, and this should be avoided in anchoring.

This port is frequently used by the schooners belonging to the fishermen and woodsmen of Chiloe. Water, wood, fish, and shellfish are found in abundance.

It is high water, full and change, in Port Maria Isabel at 0h. 8m.; tides rise 8½ feet.

**Cisnes Inlet** is an opening in the coast of James Island, 15 miles distant from the western entrance of Ninualac Channel. It is about 5 miles long and has a good anchorage in the northwest side of the entrance, about 250 yards from the shore, in 12 to 15 fathoms of water. In approaching the anchorage care should be taken to avoid a reef with deep water surrounding it. The eastern entrance point should not be approached within a depth of 9 fathoms.

**Goni, Bynon, Memory, King, Simpson, and Baeza Channels.**—These channels are not well surveyed and are known only to the masters and pilots of the schooners which frequent these regions.

In a group of islands which extends from King Channel to Tuamapu Channel the only known anchorage is in May Bay, in the island of the same name, which is partially protected with good holding ground. On Chaffers Island is Mount Mayne, 2,047 feet high, and on Midhurst Island is a peak 1,070 feet high.

From Midhurst Island as far as Tuamapu Channel a rocky barrier protects the coast on the west and the entrances of the narrow channels; this barrier should be given a wide berth.

**San Rafael Lagoon** is situated just north of the Ofqui Isthmus and constitutes the southern extremity of the great channel which, with Moraleda and Costa Channels, Elefantes Islet and Elefantes Gulf, extends from north to south for over 170 miles between Chonos Archipelago and the continental coast.

On account of the San Rafael Glacier, which descends to the lagoon on its eastern side and extends more than halfway across it, the lagoon takes the form of a crescent opening to the east, and is 12 miles long by 2 miles wide. The shores of the lagoon are generally deep; close to the rim of the glacier soundings of 28 to 40 fathoms, mud bottom, have been obtained, and more than 55 fathoms halfway between the ice and the opposite banks.

The rise and fall of the tides does not exceed 5 feet and the salinity of the water is much less than that of the neighboring channels.

**San Rafael Glacier** descends from the western slope of Mount San Valentin, 12,697 feet high, and enters the lagoon through an opening in the mountains a little more than 1 mile wide, extending in a circle of 5 miles diameter, where it passes through the waters of the lagoon. Its profile presents the aspect of a crystal wall, which in some parts measures 130 feet in height and in other parts rises just above the surface of the water. Very dangerous and terrible are the bergs which detach themselves from the part of the glacier above water, but more so are those which break from the submerged part, and which, impelled by the force of their buoyancy, appear unexpectedly on the surface of the water, with inevitable danger to the vessel

which finds itself in the way. The bergs float in the lagoon driven by the wind until the ebb tide carries them north through the Tempanos River.

**Tempanos River** is the only communication between San Rafael Lagoon and the channels to the north of it; it flows about north for 5 miles between sloping banks 30 to 50 feet high, which then disappear, and the bed of the river extends for about 4 miles more, describing a convex arc toward the north, and dredged by the floating ice through a bank of mud and rough stones which forms the bottom of Elefantes Gulf, from Leopardo Point toward the south.

The width of the river does not exceed 400 yards and its least width is 250 yards at its source; the depth in mid-channel varies between 4½ and 8 fathoms, stiff mud bottom. At 3 miles from the lagoon the river receives on the west bank a tributary of small importance.

The currents are strong during ebb tide, their velocity being estimated at 5 to 6 miles per hour at the mouth of the lagoon, where great care is required in navigating; farther down there is less stream flowing, especially during the flood.

The icebergs from San Rafael Glacier, some of which are estimated at more than 1,000 tons, come down with the currents and dredge the bottom of the river.

**False Isthmus of Ofqui.**—This name is applied to the lands which lie north of the San Rafael Lagoon and east of Tempanos River. This region is impassable on account of its marshes and thickets, and the north coast is surrounded by a large bank of mud and rough stones, with 2 fathoms of water over it, which occupies all of the southern part of Elefantes Gulf. This bank presents a peculiarity which is observed in several localities of this region being covered with bare trees standing in the water, which resemble at a distance the masts of innumerable vessels.

**Elefantes Gulf** is about 12 miles long in a northerly direction from False Isthmus of Ofqui to Quesahuen Point, which extends from the continental coast toward the west and forms with the opposite coast of Sisquelan Peninsula, Quesahuen Pass, which connects the waters of the gulf with those of Elefantes Channel. Elefantes Gulf is 4 miles broad, and from Leopardos Point northward its waters are clear and deep.

**San Rafael Road.**—This port is situated in the entrance of the Tempanos River, which, as has been said, describes in the last 4 miles of its course a convex arc toward the north, entering Elefantes Gulf in a south-southeast direction southward of Leopardos Point.

Leopardos Point is very low, long, and shelving, and from its extremity extends for more than a mile in a southerly and southeasterly direction, a chain of islets and keys. The first and principal of these

islets is called Entrada, situated 300 yards from the point; to arrive at the anchorage it is necessary to round it by the east, south, and west successively and let go the anchor halfway between the two islets which will be found on the west side of the point, as near to the shore as the draft of the vessel will permit, in order to be better protected against the currents and bergs above mentioned. The depths here are between 3¼ to 6½ fathoms, bottom of stiff mud, but vessels will be obliged to heave up their anchors frequently, as they will be buried with the yawing and swinging around caused by the currents, which run at the rate of 5 to 6 miles per hour.

It is high water, full and change, at 11h. 33m; tides rise 15 feet, but are very irregular.

**Gualas Cove** is situated in the mildle of the east coast of Elefantes Gulf. It is more than a square mile in extent, and the water is deep, making it necessary to anchor in 22 fathoms near the mouth of the river which empties into the east side of the cove and is surrounded by extensive banks of sand and mud.

Although the points of entrance are 1½ miles apart, the entrance channel, with depths of 8 to 11 fathoms, measures only a little more than 600 yards wide, as banks of sand and stone with less than 3 fathoms of water extend from both points. This anchorage is not recommended.

**Pinto Anchorage** is in the west coast of Elefantes Gulf, just opposite Gualas Cove. It is formed by a small indentation of the coast, well protected from westerly winds but very deep, necessitating the vessel's approaching very close to the shore to find 35 fathoms of water.

**Quesahuen Bay** forms the northeast corner of Elefantes Gulf between the continental coast and Quesahuen Point, a low and rugged projection which extends toward the west, forming a shelter on the south side very favorable as a protection from heavy weather from the northward or to wait the turn of the tide and the beginning of the ebb for navigating the Quesahuen Pass. Vessels may anchor here in 11 to 14 fathoms, mud bottom. The currents will swing the vessel around with the consequent danger of tripping the anchor; to prevent this the greatest vigilance is necessary.

**Quesahuen Pass.**—Quesahuen Point, which is ½ mile long, is bordered on the north and west by numerous rocks which, with Leonor Islet on the coast of Sisquelan Peninsula, form Quesahuen Pass, about ½ mile wide, the only outlet of Elefantes Gulf toward the north. The tidal stream runs in this passage at the rate of 5 to 6 miles per hour during ebb and a little less during flood, and the passage should not be attempted except with a favorable current.

**Cupquelan Inlet** opens 5 miles northeastward of Quesahuen Pass and extends in the same direction for 30 miles farther, terminating in

a wide bay. The inlet is 2 miles wide, the shores are high and snow-capped. The west shore is a long peninsula which separates this inlet from Elefantes Channel. At the southern point of this peninsula is Garrao Point.

Seven miles from this point in the east coast of Cupquelan Inlet is Esploradores Bay, formed in a transverse inlet by the point which extends from the north coast nearly across the bay, leaving but a very narrow channel. Eastward of these narrows the bay is extensive and well protected.

**Elefantes Channel** extends 36 miles in a northerly direction from Quesahuen Pass to Ramaipu Island, where it takes the name of Costa Channel. Its width is not less than 1 mile in any part, and it is bordered by high mountains which rise to snowcapped peaks, the slopes and valleys covered with woods. The channel is deep and clear and its navigation presents no difficulties except between Quesahuen Pass and Garrao Point, where there is 8 to 10 fathoms of water with the possibility of finding less.

**Raimapu Island.**—Marking the northern extreme of Elefantes Channel and the beginning of Costa Channel is Raimapu Island, situated at the confluence of Elefantes, Costa, and Chacabuco Channels and Quitralco Inlet. With ebb tide and strong contrary winds the water in this region is very choppy and dangerous for open boats. The course recommended passes eastward of Raimapu Island. Its westward passage, although wider, is filled with dangerous shoals.

**Anchorages.**—In Elefantes Channel vessels may anchor in case of necessity in 5½ to 10 fathoms of water opposite the east coast 1 mile distant from the shore between Garrao Point and the little Iclai Inlet, situated 8½ miles northward.

**Pescadores Point,** opposite which the width of the channel is only 1 mile, has on its south side a shallow cove.

At 1 mile to the northward of Pescadores Point on the coast of Simpson Island is Mogotes Cove, formed by a group of rocks and islets covered with trees, which gives them an aspect of large mushrooms. An anchorage is found at 100 yards from the shore in 7¼ fathoms of water, hard sand, but is useful only for small vessels.

It is possible occasionally to anchor 600 yards south of Raimapu Island in 14½ fathoms of water, rock bottom.

**Huemules River** descends from the mountains toward the bottom of a spacious valley and empties through two mouths into Elefantes Channel 3 miles south of Raimapu Island. This river has been explored for 30 miles and is navigable for boats for 3 miles, after which it is obstructed by a succession of banks and fallen trees.

**Quitralco Inlet** extends from the vicinity of Raimapu Island toward the northeast for 14 miles, thence in an easterly direction for 11 miles farther. It measures from ½ to 2 miles in width and its

waters are generally deep and clear; in the southeastern bay at the head of the inlet hot springs have been found.

**Tuahuencayec Channel** opens in the west coast of Elefantes Channel between Sisquelan Peninsula and Nalcayec Island, connecting Elefantes and Barro Channels. This channel is but incompletely known.

**Port Traiguen** is situated in the eastern entrance of Tuahuencayec Channel and may be recognized by a large waterfall which descends from the mountain heights of Sisquelan Peninsula and is visible for a long distance. The port is fairly well sheltered and large enough for any class of vessel; the best anchorage is in 11 fathoms, sand, opposite the sandy beach seen just westward of the waterfall.

**Luicura Channel** extends between Elefantes and Barro Channels, separating Nalcayec and Simpson Islands. It is but little known.

**Barro Channel** runs parallel to Elefantes Channel west of Nalcayec, Simpson, and other islands. From Chacabuco Channel, with which it connects by Renjifo Narrows, as far as the point where it divides and forms Thompson and Puelma Inlet, its length is about 28 miles. Renjifo Narrows is navigable only by boats, and the currents set strongly through it.

Barro Channel is wide and deep and may be navigated by vessels of any size. It is connected with Elefantes Channel by the two channels described above. At 2 to 3 miles south of San Jose Island, which is situated in the entrance of Tuahuencayec Channel, a point of the Peninsula of Taitao which projects toward the north divides Barro Channel into two arms; one, which projects toward the south, is called Thompson Inlet, while the southwestern arm is known as Puelma Inlet.

Three miles within Thompson Inlet the breadth reduces to not more than 55 yards. Beyond these narrows is Chasco Inlet, which is much wider and about 12 miles long. On account of the currents in the narrows the passage may be made only at slack water.

**Puelma Inlet** extends in a west-southwesterly direction for about 25 miles. It is clear and deep and about 1 mile wide, terminating in a kind of basin in which are various rocks and shoals and surrounded by low bluffs.

Between Puelma Inlet and Ausilio Inlet, a tributary of Cornish Opening, is a comparatively easy way of communication formed by the lakes and rivers which occupy the bottom of the valleys of this region; it is recommended to mariners shipwrecked on the seacoast of Taitao Peninsula. On both sides of Puelma Inlet, as is generally the case in this region, are mountains of considerable height, notable among which is Mount Fonk, 2,660 feet high, situated on the north

shore of the inlet, while at its head are seen three characteristic pointed mountains.

In the middle of Barro Channel are situated Lira and Goni Islets, to the westward of which leads Ultima Esperanza Channel, terminating in Albano and Vidal Inlets; and finally to the west of Fitz Roy Island extends a channel, strewn with shoals and rocks, called Carrera del Diablo, in the western shore of which opens Silva and Verdugo Inlets. All these inlets are very little known except by the wood cutters who periodically visit these regions.

**Costa Channel** is the continuation of Elefantes Channel from Raimapu Island northward, between Traiguen Island and the continental coast. It is about 21 miles long by ½ mile wide and is generally clear, but north of Raimapu Island, at a distance of 3 to 5 miles, is a rock or shoal of rough stones over which are soundings of 1½ fathoms.

The north entrance of Costa Channel between Traiguen and Churrucue Islands, which is also the southern entrance of Aysen Inlet, is very deceiving and deserving of the greatest suspicion. Description has previously been given of the shoal in this place, marked by kelp, which is situated about ½ mile northward of the north shore of Traiguen Island; and of Casma Shoal, which lies ½ mile eastward of the above danger. At low tide another rock uncovers between the two islets farther to the north and larger than the group of four which lies there; it is also marked by kelp. And in the passage between these islets and the south coast of Churrucue Island lies another shoal with soundings of less than 3 fathoms.

This region should be navigated with the greatest prudence and caution. Pilcomaya Channel is preferable for entering or leaving Aysen Inlet.

**Errazuriz Channel** runs parallel to Costa Channel, on the west side of Traiguen Island, from Chacabuco Channel to Moraleda Channel, which it joins opposite Darwin Channel. It is about 20 miles long by 2 miles wide and contains various islets and rocks which, though visible, require the greatest care to be used in its navigation; in the southern extremity of the channel between Humos and Rojas Islands is a shoal composed of large stones awash at low water. On the other hand Errazuriz Channel has the advantage of containing many places where anchorage may be found, and for this reason it is preferable to Costa Channel.

In the west shore of the channel, at about the middle of its length, is Vicuna Channel, which connects with Utarupa Channel between Humos and Luz Islands; it is useful only to small vessels. Another small channel navigable only by boats runs eastward of Rojas Island connecting Errazuriz Channel with San Ramon Bay.

South of Rainahuel Island, situated a short distance from Humos Island, is a fairly well protected anchorage in 15 fathoms of water, stone bottom.

**Moraleda Channel.**—This great channel extends north and south for about 100 miles, separating Chonos Archipelago from the continental coast. Its width, which, by the presence of various islands, is reduced in the southern part to only 2 to 3 miles, from Tuap Island northward is not less than 6 miles.

The best guide for the navigation of this channel is the chart, and although the waters are generally deep and clear, without any important dangers more than ½ mile from the shore, except Chacabuco Rock, it would be well always to have a lookout stationed aloft, since the kelp, which frequently marks the rocky places, may be submerged by the currents.

Moraleda Channel is the highway which leads from Corcovado Gulf to the interior sounds and inlets of the northern part of the Peninsula of Taitao, communicating with the ocean by Pulluche, Darwin, Ninualac and other smaller channels, and forming with them a safe route exempt from the dangers and difficulties experienced in the navigation of the outer coast of the archipelago.

The eastern shore is generally high, rising abruptly from the water's edge, and is pierced by deep sounds. On the coast are mountains of considerable height; north of Aysen Inlet are Mounts Cay and Maca, the latter being 9,712 feet high; Mount Montalat, in Magdalena Island, measures 5,446 feet in height; and Mount Melimoyu, at the highest part of Mulchey Island, is 7,874 feet high, and notable for the sharp, white points which crown it.

The west coast of the channel is much lower than the east, the highest land being Mount Cuptana of 5,366 feet in height, the only one on this side which is snow capped during the summer, and for which reason it is also called Mount Nevado.

Aside from the numerous channels which open in this coast there are on this side all the known and recommended ports of the region; the east coast is not so well explored and is further from the usual route than the west coast.

**Barba Islands.**—This group is formed of four principal islands—Mitahues, Pescetto, Chierchia, Castillo (Serra), and others of less importance, which extend in succession from south to north, from the mouth of Darwin Channel as far as Port Lagunas. Between this group and the large islands named Quemada and Victory runs a channel which has not been sufficiently explored, but which appears to be of not much use to navigation, as it contains Fanny Rock, situated northwestward of Mitahues Island, and other rocks in the vicinity of Chierchia Island.

To proceed, therefore, to Darwin Channel, Port Lagunas, or farther north the course should be laid a good distance eastward to Mitahues, Pescetto, and Santa Maria Islands, the last one being distinguished by a prominent rock of peculiar formation situated northeastward of it.

**Port Lagunas** is situated 9 miles north of Darwin Channel and is formed between the southeast point of Melchor Island and Castillo Island, of the Barba group. On account of its spacious size, the moderate depths of its waters, and the ease of its access, it is without doubt one of the best in the Chonos Archipelago, capable of sheltering a numerous fleet. Its bottom is very even, decreasing regularly from 20 to 5 fathoms in depth, with holding ground of sand. Water, wood, and fish are abundant.

The best protected part of this bay is Sepulcro Cove, about one square mile in extent, situated in the northwest side of the bay. The holding ground here is equally good and the depth varies from 8 to 12 fathoms.

The known hidden dangers in Port Lagunas are: A rock situated about 400 yards southwest of Tizzoni Island, which is out of the way of the anchorage; a rock 100 yards south of the east point of the bay; a shoal with the least depth of ¾ fathom which lies 9 miles, 80° from the summit of Tizzoni Island, known as Otrano Shoal; and a reef which dries at low water extending southward of the small islet eastward of Tizzoni Island.

Leaving Port Lagunas for the north, or approaching from that direction, care should be taken to avoid a submerged rocky patch which extends from an islet situated 2½ miles north of the east entrance point of Port Lagunas, almost in the center of the bay which is formed there; this shoal extends for about 1 mile toward the east.

**Blanco and El Morro Islets.**—Of the islets which extend northwest from Meninea Island the farthest is called Blanco, having a white patch on its north side. A little eastward of the line between this islet and El Morro (another small islet situated 5 miles farther north), at 1¼ miles from the former, is a submerged rock connected with the islet by a shoal ridge.

**Aysen Inlet.**—Opposite Port Lagunas in the continental coast is Aysen Islet, in the entrance of which lies a group of numerous islets, the principal ones of which are Meninea, Chaculay, Churrecue, and Elena. This inlet, clear and deep in all parts, is accessible south of the two islands last named, but this passage contains dangers which were mentioned under the remarks of Costa Channel, for which reason it is recommended to proceed by way of Pilcomayo Channel, which runs north of the group. Aysen Inlet is 30 miles

long, with an average width of 1 to 2 miles, and contains no known dangers except at its entrance.

**Pilcomayo Passage** runs north of Chaculay, Churrecue, and Elena Islands around to the south of Oyarzun Peninsula of the continental coast. It opens between two small islands, Costa and Scila, situated off the northwest extremity of Chaculay Island about 500 yards apart; this is the narrowest part of Pilcomayo Passage and is the only place which offers any difficulty.

Proceeding from Moraleda Channel north or south, when a vessel is about halfway between Blanco and El Morro Islands, there will be seen toward the east a third island, round and covered with vegetation, well separated from the former; this is Direction Island. Steering to pass a little more than a mile to the south of it, the entrance to Pilcomayo Passage will be seen approximately east-southeast between Costa and Scila Islands. Head in that direction, taking care not to be set to the southward, where rocks and kelp extend from the islets of that side. On this course there is plenty of water, except in the entrance of the narrows, where there are soundings of 11 fathoms. Toward the east the depths increase and navigation presents no difficulties, steering for the center of Carvallo Islet, standing moderately close to the shore of Chaculay Island until arriving at a point about 1 mile north of Sofla Point. Passing south of Carvallo Island at about the same distance, and north of Elena Island, there are no dangers in this region.

In the shoals at the entrance of Pilcomayo Passage heavy tide rips are formed, especially with ebb tide and westerly winds. The ebb current appears to reach at this point a velocity of 3 to 4 miles an hour, and the westward passage of these narrows should always be made during flood tide.

Standing for this passage, in case it is obscured by rain or otherwise, the peaks of Melchor Island, on the other side of Moraleda Channel, which are higher than the others in the vicinity and visible from opposite Sofla Point, are recommended as points of reference.

**Port Perez** is situated about 3 miles from the southeast extremity of Elena Island, in the northwest part of the elbow which Aysen Inlet forms in turning southwestward. Although the holding ground is of sand and mud, this anchorage can not be recommended, as the bottom is very steep, it being necessary to approach the shore very closely to get depths of 17 to 22 fathoms. These circumstances, as well as the fact that the land which surrounds the port on the north is very low, make it easy for vessels to drag their anchors, even in moderate offshore winds. Around Five Brothers Islands the water is very deep. Fifteen miles eastward of Port Perez, in the south coast of the inlet, is a peninsula which forms a cove on its south side, with

soundings of 22 fathoms in the eastern part and 11 to 12 in the western part.

It is high water, full and change, at 1h. 12 m.; tide rises 8 feet.

**Port Chacabuco.**—This port is situated at the head of Aysen Inlet, in the south coast, 18 miles southeastward of Five Brothers Islands. It is reached by a short channel extending south of Carmen Island, which protects it against winds from the northwest; it measures about 1 mile in length.

At the head of the port, in the southwest coast, a small stream empties, which has made this part of the bay shoal. It is necessary to keep this fact in mind in approaching the anchorage, steering about south and keeping the mouth of the stream open on the starboard side. The anchor may be let go in 11 fathoms, mud bottom, with the mouth of the stream bearing 264° and West Point bearing 344°.

It is high water, full and change, at 1h. 15m.; tides rise 7 feet.

Water is abundant and easily procured; good fish are plentiful.

**Aysen River** empties into the head of Aysen Inlet about 2 miles north of Port Chacabuco. It is about 15 miles long to the confluence of Manihuales and Simpson Rivers, which form it; the former flowing from the north and the latter from the south constitute together one of the greatest watersheds of the Andes. The boundary line of the Argentine Republic passes in this region about 50 miles eastward of the mouth of the Aysen.

The river is navigable by boats for about 7 miles from its mouth, at which point it is joined by the Rio Blanco and the rapids, ½ mile long, prevent further advance. Palos River is another tributary which flows into the Aysen from the north about 2½ miles from the mouth; access to this river is dangerous on account of an extensive bank of mud which is dotted with trunks of submerged trees. The depth on the bar is from 1 to 2¼ fathoms, but at ebb tide boats ground here.

On the extensive valley lands of the Upper Aysen and at its tributaries grazing has been established with good success; the number of people engaged in this industry is estimated at 400.

**Auchile, Guia, and Tuap Islands.**—The continental coast northward for 22 miles from Aysen Inlet has been but incompletely examined, and the outline shown on the chart is made from information gained by navigators of this region. This part of the coast is very mountainous and among the high peaks are Mount Maca, 9,712 feet high, and Mount Cay eastward of it.

A numerous group of islands extends toward the west, those lying nearest to the coast being Auchile, Guia, and Tuap. The first is high and divided into two peaks, one sharp and small and the other flat and separated by a remarkable crevice; it is situated off Port Americano and 5 miles north of El Morro.

Guia Island, 5 miles farther north, is low, with easy slopes. Extending from it toward the south are several detached rocks, and about 400 yards southwest of it is a submerged rock.

Tuap Island is the most northerly of the group, which circumstance makes it most favorable as a point of reference.

**Cay and Jacaf Channels.**—At 22 miles north of Aysen Inlet, Cay Channel opens to the eastward and passes southward and eastward of Magdalena Island, uniting at the end of 50 miles with Jacaf Channel, which comes around the island from the north. These channels together measure 80 miles in length, and their waters are generally clear and deep.

**Magdalena Island.**—This large island extends into the continental coast, from which it is divided by the channels just mentioned. In its central part the extinct volcano Montalat rises to a height of 5,446 feet. The crater is at all times full of snow.

In the west coast of the island is Pangal Inlet, which is of no use to navigation. Five miles farther north of this is Senec Island, low and sloping, forming a good day mark, which should be left to the eastward in passing.

**Los Cayes.**—From Calqueman Point to Jacaf Channel the coast is foul and should not be approached even though it appears free of dangers. Opposite Atilio Island and at 3 miles from it are Los Cayes, which are distinctive, as one is black and the other is white. They should be left to eastward in passing.

**Chacabuco Rock** is situated opposite the opening of Jacaf Channel, 4 miles north-northwest of Los Cayes. It is submerged and the kelp growing on it is frequently carried under by the currents. Surrounding it is deep water. To avoid this rock it is convenient to approach the Quincheles group, as Gorro Islet may be passed as close as desired.

**Negra Rock,** whose dark color gives it its name, is situated about 3 miles off the continental coast and 4½ miles eastward of Mulchey Island.

**Barranco, Yalax, and Refujio Islands** are situated a short distance from the continental coast. The first is high and shows toward the west a large, white ravine, making it very noticeable; the second lies 3 miles northward, separated from Refujio Island by the narrow, stony channel. Refujio Island is high and rugged and easily distinguished from the north. Santo Domingo Channel, narrow and deep, separates it from the continent.

In the exterior coast of this island is Caniao Islet, which is distinctly visible from Moraleda Channel. There appears to be a passage between it and Refujio Island, but in reality there is not a passage even for boats.

**Locos Island,** about 600 yards long and covered with trees, lies nearly in the center of Magdalena Channel, 6 miles from either shore; the west side of the islet is clear, but there is foul ground to the north and northeastward of it with rocks outlying.

**Santo Domingo Channel** separates Refujio Island from the continent. It is deep and clear and in it opens the port of the same name. Its width is variable without diminishing to less than ½ mile; it contains various islands which do not impede navigation. From the group situated opposite Mala Bay rocky shoals extend toward the north, which should be left to the westward of the course.

**Port Santo Domingo** is situated about 4 miles within the channel of the same name, entering from the north, in the continental coast. The land north of it is very low and terminates in a steep, sandy point, which vessels may round at a short distance. Behind this point is an anchorage, little protected on account of the low surrounding land, with comparatively deep water. At 600 yards from the shore are soundings of 25 fathoms.

**Islas Bay** is a little inlet which opens into the continental coast just north of Santo Domingo Channel. A group of islets, from which the bay takes its name, protects it from the sea from the northwest. This bay is useful for sloops and similar vessels; large vessels should avoid this locality on account of the dangers both visible and submerged.

**Palena Road.**—At 7½ miles north of Islas Bay is Guala Point, the western extremity of Coca Peninsula, southward of which opens Palena Road, 2 miles wide by 4 miles long, in the bottom of which is Piti Palena Inlet where there is good anchorage, and Buta Palena River, or simply Palena, which is accessible only by boats, on account of the bar.

The water in the road is green and very deep. Soundings of 28 fathoms extend to within 1 mile of Aleones Island.

**Las Hermanas Group.**—These islands form the south side of Palena Road. There are two principal islands of regular dimensions and several smaller islands, all covered with vegetation. Southeast of them, at a distance of 600 yards, are the Farallons de los Lobos, from which toward Pajaros Islets the waters are dangerous, shoaling rapidly in the direction of Palena Point, at ½ mile from which are soundings of only 1¾ fathoms.

**Leones and Los Canales Islands.**—Both are low and thickly wooded and their formation is due to the silt carried down by the Palena River, the islands forming the north shore of its mouth and separating it from Piti Palena Inlet.

The east coast of Leones, from the mouth of the Palena to Frutillar Point, is bordered by an extensive bank of sand and mud of the

same origin as the island, forming the bar of the river. This bank extends about 1 mile off, and its highest part dries at low water; at high water it is marked by breakers; it is situated on the line between Frutillar Point, the north extreme of Leones Island, and the east extreme of the Hermanas Group, making two channels for entering the river.

The depth and direction of these channels are very variable, but generally there are depths of ½ to 2 fathoms at high water.

**Piti Palena Inlet** opens in the head of Palena Road between Leones Island and the south coast of Coca Peninsula. Its course is first toward the east, with an average width of ½ mile and depths varying between 10 and 20 fathoms. At the end of a mile it turns to the south-southeast between Frutillar Point and a small islet in the entrance of Patos Inlet and maintains this direction for 2¼ miles, with mid-channel depths of 11 to 17 fathoms.

At Islote Point, the southern extremity of Coca Peninsula, the inlet takes an easterly direction for 5 miles, increasing gradually to a depth of no bottom at 27 fathoms.

At this point the inlet divides; one arm, known as Pillan Arm, extends between high rugged mountains toward the north, reaching nearly to the valley of Tictoc River; the other arm, wide and shoal, with a depth of less than 1 fathom, extends toward the south, terminating in a muddy bay, where there is the mouth of a good-sized river.

**Anchorages.**—Piti Palena Inlet offers two good anchorages, both situated east of Leones Island. The first is Pescadores Cove, less than 0.8 mile south of Frutillar Point; the anchorage here is in about 8 fathoms, sandy bottom, and convenient except for the strength of the tidal currents, which run as high as 3 miles an hour. The second anchorage, called Corrales Bay, is 1 mile farther south, opposite Pescadores Cove; it is large and better protected against the wind than Pescadores Cove, and the currents are not so strong; the depths at this anchorage vary from 9 to 11 fathoms. At the entrance of this bay the water is shoal, but deepens rapidly. The coast of Coca Peninsula, formed of high and rugged mountains, contains no off-lying dangers.

**Directions.**—Piti Palena Inlet is navigable in all parts by vessels of any size. Sailing vessels approaching this inlet should stand close to the shore of Coca Peninsula until opposite Piti Point, from which point, maintaining a mid-channel course, it is necessary to tack to the southward about 8 points to avoid the islet at the entrance of Patos Inlet, a submerged rock near it, and Frutillar Point.

Having effected this maneuver, the working qualities of the vessel and the direction and rate of the currents, which in this part reach a velocity of 4 miles an hour, must be taken into account. The

current produces tide rips, which increase the difficulties of navigation. Within the inlet steer always in mid-channel until reaching the desired anchorage. But if it is intended to continue the course to the head of the inlet it is advisable to round Islote Point at a distance of 200 to 400 yards to avoid an islet and a submerged rock which lie south of the point. Care should also be taken not to approach too closely the shore of Leones Island, off which is shoal water. After rounding Islote Point stand near the north shore and keep the lead going.

**Buta Palena River.**—This river, which is sometimes called Palena, is one of the most important of Chile and empties into Palena Road 5 miles north of Islas Bay. The mouth lies between Leones Island and Palena Point, the latter sandy and from which rises a high rough headland. At low tide a reef projects northwestward from the point about 600 yards.

This river is navigable from the mouth as far as the first rapids, which are encountered 15 miles in the interior. For any vessel up to 9 feet draft the only difficulty which may be expected is the passage of the bar; it must be taken at high tide and even then there is sometimes but little water on it. The direction of the channel crossing the bar, and also the depths, are very variable. No vessel should attempt to cross the bar without previously sounding it.

Above the bar the river measures over 400 yards in width and its depth at low tide is from 16 to 23 feet. From 1 mile within the channel, as far as the first rapids, the width varies between 300 to 900 yards, always in a single channel. The depths are uneven but are nowhere less than 12 feet, deepening in places to nearly 21 feet. The channel flows generally closer to the south shore than the north, or, in other words, runs near the hilly side of the river.

Between the mouth and the first rapids are three islands and two transverse channels which communicate with Piti Palena Inlet. The islands are: Boca, 1 mile from the entrance; Del Medio, 7 miles farther up; and Del Lade, scarcely 400 yards from the island just named. The channels are Garrao, which separates Leones Island from Los Canales, and Abe Channel, which separates the last named island from the continental coast.

Garrao Channel measures 50 to 100 yards wide, and its depth, less than 3 feet in each entrance, is generally about 6 feet. Abe Channel is much more narrow, about 25 to 30 yards, but its depth is not less than 6 feet and in some places deepens to 15 feet; at its confluence with Piti Palena Inlet the depth measures less than 3 feet at low tide. The current in both channels is always outward.

During spring tides the flood currents in the Palena River are felt as far up as the vicinity of Del Medio Island, but do not pass Garrao Channel during ordinary tides and then only for two or three hours.

However, the level of the water rises and falls with the tides as far the first rapids, where the amplitude of the movement is only a few inches, causing the currents always to flow down the river with a velocity varying between 2 and 4 miles an hour. The difference in the level of the river between the mouth and the first rapids is about 50 feet, according to barometric measurements. Above the first rapids the river is about the same width, but the current is stronger, and rapids succeed each other about every half mile.

**Coca Peninsula.**—The aspect of this peninsula is very imposing on account of the high, rugged mountains which form it. It is covered with a thick forest from the water's edge to the summit. The rocky shores are generally clear. The currents in the vicinity are strong, producing tide rips.

**Port Americano.**—This harbor is in the south side of Tangbac Island, 16 miles north of Port Lagunas and 8 miles from El Morro Islet. Its location is distinguished by Americano Mountain, 2,018 feet high, with a flat summit, which rises in the southern extreme of the island, southeastward of which lie two islets, the farther of which is situated about 1 mile from the shore. Although the water appears deep between them, it is advisable not to use this passage.

There are two anchorages, one outside and one inside. The first is open only to winds from southeast to southwest; the depth varies between 14 and 25 fathoms, rock bottom, and the anchoring space is sufficient, although from the east shore a sand bank projects, which is apparently extending. The second anchorage is a perfect basin, well protected, with bottom of sand and mud and depths of 5 to 10 fathoms; it is large enough for several vessels to anchor in. The entrance is clear, but narrow and tortuous, the depths in the middle being between 2¾ to 4½ fathoms.

It is high water, full and change, in Port Americano at 2h. 40m.; springs rise 6½ feet.

**Westoff and Blanco Rocks.**—These have been previously described.

**Perez Channel** opens between Teresa and Transito Islands, 8 miles north of Tangbac, and runs in a general north and south direction, west of the first group of islands which form the western border of Moraleda Channel. Its course is not very uniform nor continuous, on account of the numerous islets which lie in it; it is, however, about 50 miles long, connecting in the north with Tuamapu Channel, which runs south of the Guaitecas Group. The outline of this channel which appears on the charts is drawn simply from sketches made from a sailboat.

**Port Frances** is 15 miles north of Port Americano in the east coast of Transito Island, in the middle of a group of rocks and islets known by the name of Enjambre. The anchorage is near the shore, opposite

and eastward of the small inlet which enters Transito Island; the bottom is sand and mud over stones, with depths of from 10 to 17 fathoms. Great care should be used in entering this port on account of the submerged rock known as Janequeo, situated 600 yards northeast of the largest of the islets on the south side of the port; to clear this it is well to stand near the islets on the north side, where there are no known dangers.

La Mesa Mountain, 1,509 feet high, is a good landmark for this port. Among the Enjambre Rocks, one of the most prominent groups in the channel, is a particularly notable white islet.

It is high water, full and change, in Port Frances at 2h. 30m.; springs rise 9 feet.

**Sierra Point** lies closer to the course than any other point on the west shore of Moraleda Channel. It is of medium height, and its profile presents a succession of isolated cliffs with flat tops. It is situated 4 miles north of Port Frances at the entrance of Temuan Channel.

**Port Cuptana** lies 8½ miles north of Port Frances, and may be located by Mount Cuptana, 5,446 feet high, the only peak in this region which is covered by snow during the summer. The anchorage, which is well sheltered and of good size, is in 16 fathoms of water opposite the sandy point of Letreros Island, which forms the north side of the harbor; the entrance is clear.

**Port Nassau** lies in the shelter of Francisco Island, opposite its southeast extremity. The depth varies from 5½ to 20 fathoms, stone bottom; the entrance to the port and the anchorage is clear, but it is recommended only for short stays.

**Quincheles Islands.**—This is a group of high, precipitous islands, the eastern one of which is called El Gorro on account of its round, steep, bare formation. El Gorro may be passed close-to, which is convenient in avoiding Chacabuco Rock.

**Port Ballenas.**—This harbor is formed by Mulchey and Mike Islands and is large and good. Inside the port are 4 islands which lie to the westward of the anchorage. The anchorage is in line with a rock (visible at low water) which lies northward of the next to the last islet on the port side in entering, and the south extreme of the other islet which lies to the northwest and which is also the last and closest islet to the shore. A vessel will be very near the anchorage when the channel which separates Mulchey and Mike Islands is no longer open. The depth then will be about 17 fathoms, but farther in a depth of 14 fathoms will be found, bottom of sand. The anchorage is good, well protected, and spacious; nevertheless, during strong winds from the northwest care is necessary on account of violent squalls which come down the valley on that side.

**Tuamapu Channel.**—This channel, which extends in a direction east-southeast and opposite, south of the Guaitecas Islands, is about 30 miles long and quite wide, but it connects with Moraleda Channel only by short narrow channels formed between the islands Garcia, Aguayo, Serrano, Verdugo, and Leucayec, the one leading between the last two named being the best known.

Proceeding from Moraleda Channel, pass between Sanchez and Serrano Islands, the latter being marked by two small islets off its north point, and then between Verdugo and Leucayec Islands, through a passage which measures scarcely 600 yards in width and where the currents run at the rate of 3 to 4 miles an hour. This course is recommended only for small vessels, which must navigate with the greatest caution, as its waters are but imperfectly explored.

In this vicinity, where lie the islands Bobes, Ceres, Jack, Amortajado, and others, are the entrances to Perez Channel, on the south side, and to Leucayec Channel, which leads to Melinca, on the north side.

**Jemelos Islands.**—These islets are situated about 2 miles south of Betecoi Island. From the most northerly of them shoal water extends about 200 yards to the north, and at a distance of 600 yards is an isolated shoal having 16 feet of water over it, steep-to, with deep water surrounding it; it is small and not marked by kelp. Cruising in these waters, a vessel should not approach the shore within a distance of 800 yards.

**Pochas Islands.**—These two islands are situated northeast of Jemelos Islands, halfway between them and Betecoi Island. They are low and about 200 yards long, with one lying north of the other and separated by a channel ¼ mile wide, with depths of 8 fathoms. Both islands are surrounded by shoal water for a distance of 300 yards, and at about 1 mile, 78° from the northern islet, a shoal is reported to exist. The course may be laid either north or south of these islets, the former being preferable.

**Port Barrientos.**—This port which, on account of its conditions and ease of access, is considered the best in the region of the Guaitecas Islands, is situated in Tuamapu Channel, in the middle of the south coast of Guaiteca Island. It is 1½ miles deep in an approximate north and south direction and the width at the entrance is 0.7 mile. Although open to winds from the south and southwest, a vessel will be well protected in this port when anchored near the head of the bay, where the depth is 11 fathoms, over mud bottom; farther outside the bottom is of sand and rock. In the middle of the entrance is a shoal with depths of 5 fathoms; this shoal is of small extent and vessels entering may pass on either side of it.

The west point of the entrance is low and rocky, with shoal water extending 500 yards from it, upon which the sea breaks violently

with southwest winds. Near the east entrance point and separated from it by a channel 600 yards wide and about 6 fathoms deep, is situated Cae Islet, bordered on the south by breakers and reefs. Eight hundred yards southeast of this islet is another islet surrounded by rocks.

It is high water, full and change, in Port Barrientos, at 11h. 30m.; springs rise 6 feet.

**Port Rhone** is situated on the south side of Tuamapu Channel, between the Rhone Islands and Riquelme Island and a chain of islands and rocks which borders the anchorage on the west side. The port is accessible from the eastward, and in entering pass eastward of the larger Rhone Island at a distance of not less than 800 yards, anchoring in about 11 fathoms south of the narrow, obstructed channel which separates the two Rhone Islands. This port is not recommended, as the holding ground is rocky and the anchorage is exposed to winds and currents from the west.

It is high water, full and change, in this port at 11h. 55m.; springs rise 5½ feet.

The Rhone Islands are low and surrounded by foul ground for a distance of 400 to 600 yards off; at 0.9 mile 295° from the extremity of the western island is a submerged rock which is not marked by kelp.

**Riquelme Island,** a little higher than the Rhone Islands, is also surrounded by reefs and its eastern point is particularly rocky. From its eastern point, extending in a 60° direction to a distance of 0.8 mile, is a reef with 1¾ fathoms water at low tide over which the sea occasionally breaks.

**Petun Rock.**—This rock is situated just east of Port Rhone, at a distance of 2 miles from the entrance. At 1,100 yards from it are two shoals with 1¾ and 2¾ fathoms of water, respectively, and covered thickly with kelp. From the first Petun Rock bears 77°, and from the second it bears 349°. The shoals which have been discovered signify that the bottom in the vicinity of Port Rhone is very irregular, and therefore great caution should be used in navigating this region.

**Bajas Islands.**—This group, formed of about 30 small and large islands, is situated in the middle of the western entrance of Tuamapu Channel. The islands are low and thickly wooded.

Vessels may pass either north or south of this group, but in the vicinity are numerous rocks, particularly to the south and west of them, and on this side the islands should not be approached nearer than ¾ mile. There is no anchorage among these islands for vessels larger than a sloop.

**Tuamapu Island** is situated southwestward of the Bajas Islands, and, with Guaiteca Island, forms the western entrance of Tuamapu

Channel. The island is high and rocky, with foul ground around it, particularly on the west side, where there is a barrier of rocks which closes the narrow channel which separates this island from Llenihuenu Island. At 700 yards from the north shore of the island is a rock generally marked by breakers.

**Elvira and Leucayec Islands.**—The first of these islands lies just north of Mulchey Island and the second westward of the first. At 2½ miles eastward of Elvira Island is a little low islet, and at the same distance northward is Pato Islet with three rocks on its north side 200 yards from it.

On Leucayec Island stands Mount Mantan, 1,345 feet high, which is conspicuous when seen from the north.

**Manzano Islands and Channel.**—This group of islands is quite numerous and extends north from Leucayec Island from which it is separated by Manzano Channel, about 1 mile wide and with depths of not less than 9 fathoms. The route through this channel is favorable for the vessels proceeding toward Melinca from the south, or which leave this port bound in that direction.

The eastern part of the Manzano Group consists of a large number of islets and rocks, of which the ones nearest the course through Moraleda Channel are called Loquitos; all of these should be given a good berth. Yates Island, the northernmost of the group, is 331 feet high, and the waters north of it are clear.

**Leucayec and Carbunco Channels.**—The first runs northeastward of the island of the same name and separates it from Betecoi and Clotilde Islands. Eastward of the latter named is a chain of small islets which divides the channel in two, giving the name of Carbunco to the western one, or that which runs along Clotilde Island. The latter channel is not recommended on account of the currents, which reach a rate of 4 miles an hour, and two dangers, viz, a ledge of submerged rocks, which is marked by kelp, situated northwest of Mercedes Island, and an isolated rock which lies northeast of Fresia Island. Carbunco Island may be rounded using ordinary caution.

According to the masters of vessels which use Leucayec Channel there are no dangers in its mid-channel and the water is deep; its least width, west of Emma Island, is about 0.7 mile.

**Betecoi Cove** is situated in the east coast of Betecoi Island, in Leucayec Channel. This is a convenient place to make a short stay while waiting for change of weather or tide. The anchorage is in 11 fathoms, stone bottom.

**Momia Cove.**—Aside from being situated in Carbunco Channel, somewhat out of the usual course and with the dangers already mentioned, this cove is very suitable for small vessels on account of its good shelter and holding ground. It is recommended to anchor

in the entrance in 5½ fathoms, avoiding a rocky shoal of 2¾ fathoms which extends from the coast of Fresia Island halfway across the entrance of the cove.

**Melinca Bay.**—This bay is formed in the southeast extremity of Ascension Island at the junction of Leucayec and Manzano Channels and Westhoff Passages, which lead to Corcovado Gulf, by all of which it is accessible. The depth is considerable, making it necessary to anchor in 11 to 14 fathoms near the shore, halfway between Melinca and Valiza Points. At this place the bottom is of stones and anchors do not always hold well. The shore of this anchorage is bordered by a shoal of sand and pebbles about 400 yards wide.

From Valiza Point the coast falls away toward the northwest and then northeast, forming Alvarez Inlet, more than ½ mile long, with very shoal water and full of rocks. In the entrance is formed Carolina Anchorage, which offers very good anchorage in 17 fathoms of water over bottom of sand and mud, it being necessary to let go the anchor in line with the beacon and the west point. At the head of Alvarez Inlet a stream of good fresh water empties.

It is high water, full and change, in Melinca Bay, at 0h. 7m.; springs rise 10 feet.

**Light.**—At 1½ miles north of Melinca Point, almost joined to the east coast of Ascension Island, is Falsa Islet, on which is exhibited a fixed white light elevated 45 feet above the water and visible under favorable conditions from a distance of 15 miles. The light is shown from a skeleton iron tower, square in shape and painted red.

**Beacon.**—On the rock which lies farthest south of Valiza Point is a beacon consisting of a post with a red conical top mark, 25 feet above the top of the rock which covers and uncovers with the tide. This beacon is situated less than 200 yards from the shore, and close to it on the south side is clear water, with depths of 5½ fathoms less than 100 yards off.

**Directions.**—To enter Melinca Bay, coming from the north, it is necessary to pick up Canelo Island and Falsa Islet with its lighthouse. Although the passage between Canelo Island and Ascension Island has been used, there is no advantage in doing so, it being always preferable to lay the course eastward of Canelo, thence a short distance from Falsa Islet, and enter the port on either side of Westhoff Island. The west passage, thought narrow, is deep.

Proceeding from Moraleda Channel, the port may be entered by Manzano Channel, thus avoiding rounding northward of Manzano Islands. This channel is clear and the current does not often exceed a velocity of 3 miles an hour.

Leucayec channel is recommended for vessels bound to or from Tuamapu Channel. Its navigation presents no difficulties, it being

necessary only to give close attention to the direction and rate of the currents. Mercedes Island has rocks and reefs extending 400 yards north of it; it is therefore necessary to avoid this vicinity.

**Population and commerce.**—Melinca is the only inhabited port on the west coast of Patagonia between the Magellan Strait and Corcovado Gulf, and its fixed population numbers about 70 people, which number will grow with the extension of the industries of wood cutting and fishing. The village consists of about 25 houses; there is a public school and a number of storehouses where provisions may be obtained.

Melinca is the point of distribution of all the timber which is cut in the Chonos Archipelago, whence it is transported to the northern ports of Chile. In 1906 there entered Melinca 26 steam or sail vessels of a total tonnage of 17,432 tons, and in 1911 this number reached 97 vessels with 65,485 tons. In the same years the imports and exports were more than doubled.

Communication is maintained with the rest of the country by steamship lines, those of South American Company having a service inside Chiloe Archipelago as far as Port Montt, which reaches Melinca every 15 days on the voyage between Valparaiso and Punta Arenas. Steamers of the Braun-Blanchard Line stop at this port every 25 days, and small steamers of the interior service of Chiloe call at this port once a month.

**Betecoi and Guervo Channels** bound Betecoi Island on the north and west; the first is deep and clear, but the second is obstructed in its entrance to Tuamapu Channel by several rocks, submerged and visible, which leave no anchorage, and a passage only for small vessels.

**Lagreze and Puquitin Channels.**—These channels run along the south, west and north sides of Ascension Island, but are not of much importance on account of their bad conditions. The eastern entrance to each one is obstructed by a sand and rock barrier leaving a passage only for small vessels. The barrier of Puquitin Channel is known by the name of La Tranca.

**Granizo, Puquitin, and Trau Coves** are useful only for sloops or other small vessels. The first opens on the eastern coast of Ascension Island, the second lies in the entrance of Puquitin Channel, and the third is in the coast of Guaiteca Island at the foot of Mount Trau, 482 feet high. The last is larger than the first two, but several islets and rocks obstruct the greater part of it.

**Low Bay.**—The north extreme of Guaiteca Island is called Chayalime Point, the end of the highland which extends north of Mount Trau. West of it the coast, of very irregular outline and bordered by numerous islets and rocks, tends in a general southwesterly

direction, forming Low Bay, which is about 5 miles wide, with its western side formed by Marta and Huacanec Islands.

Bordering the bay is a chain of hills of medium height which descends to sea level by easy slopes in the eastern part; the coast here presents deep indentations and is fronted by a chain of rocks and islands, among which the principal ones are the Gaviotas. This group should be rounded by the north and west at a distance of not less than 1 mile.

Toward the southeast the mountains become less high in the region of the isthmus which separates the waters of Low Bay from Puquitin Channel. The coast there is very low, and the shore, shelving and marshy, uncovers for about ½ mile at low tide. A chain of rocks and islets borders it, reaching as far offshore as Blanco Rock, around which foul ground extends for more than 400 yards. Sarjento Island should not be approached on the west side nearer than ¾ mile. A footpath across the isthmus permits of communication with Puquitin Channel.

From Sarjento Island westward the coast presents cliffs of medium height, and the shore is generally of sand and round pebbles. The mountains in this part of the island reach an elevation of about 900 feet.

Marta and Huacanec Islands form the shelter of the anchorage on the west and north sides, but narrow and obstructed channels separate one from the other and from Guaiteca Island. Marta Island is 367 feet high and from it a chain of islets extends to the westward, bordering the coast as far as Patgui Point; the largest and westernmost of these islets is called Pajaronino, from which breakers extend in a 355° direction for a distance of 1 mile.

Huacanec Island, which is larger and more prominent than Marta Island, has the outline of a staircase, which makes it easily recognized. Its north and south points are low and rocky, and from the south a reef projects in a southeasterly direction for 400 yards, ending in a rock which uncovers at low water. In the vicinity of the point are three islets in line, the northernmost of which, called Neptuno, has no dangers near it.

**Anchorages.**—Low Bay contains two anchorages, which are called the exterior and interior. The first is comprised between Huacanec and Sarjento Islands; it is somewhat exposed to winds from the northwest, but aside from this circumstance a vessel will be very secure here, anchoring in 17 fathoms of water, sand bottom.

During strong winds from the west it will be convenient to anchor in the interior anchorage, proceeding in on soundings. Attention should be given to the rocky spit south of Huacanec Island and a shoal which lies in the same direction at ½ mile from the point.

Soundings of 4½ fathoms have been made on this shoal, but there is probably less water on it.

**Tides.**—It is high water, full and change, in Low Bay at 0h. 15m.; springs rise 9 feet.

**Directions.**—Coming from the westward, Huacanec Island may be easily recognized on account of its characteristic profile and by it the position of the port may be made out. Particular attention should be given in approaching to the currents which prevail in the entrance of Cocovado Gulf; the flood current is greatly accelerated by southwest winds and a vessel coming from the south might be set upon the reefs off the west coast of the archipelago. In the vicinity of Chayalime Point strong eddies and tide rips are formed, on account of it being a meeting point of the flood and ebb currents of the gulf.

**Provisions.**—Water is abundant, and notwithstanding its red color, is of good quality. The supply of wood is inexhaustible. Shellfish abound in all the shores and plenty of fish may be taken; game is plentiful in the woods and wild vegetables in the fields. Cattle may be pastured on both Marta and Huacanec Islands.

**Queitao Islands** consist of a group of two islands ¾ mile in extent, and other smaller islands situated north of them, separated from one another by narrow channels in which small vessels may find shelter. The largest island of the group is farthest west and on it a rocky hill rises to a height of 377 feet. The other hills are low and covered with vegetation.

Queitao Islands are situated at the beginning and almost in the middle of Moraleda Channel and very little north of the latitude of Guala Point, distant from it 19 miles, and 13½ miles 48° from Falsa Point Light. Queitao Islands in line with Mount Carcovado leads direct from Melinca.

In general this group may be approached from any direction to a distance of 600 yards, as there are no dangers in this vicinity, except as follows: A rock awash situated 200 yards northwestward of the northernmost island, and another submerged rock over which there is a depth of ¾ fathom at low water, situated 400 yards southwestward of the shore of the largest island; 330 yards 347° from this last rock is another small rock which covers and uncovers with the tide.

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